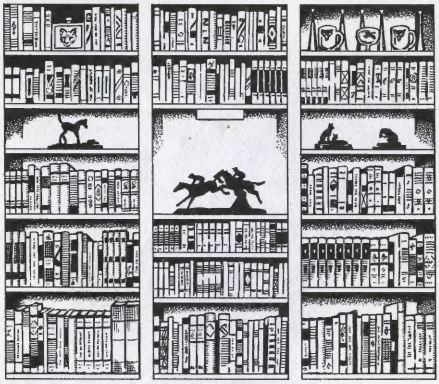

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JOHN AND MARTHA DANIELS

SALMONIA;

OR,

DAYS OF FLY FISHING.

In a Series of Conversations.

WITH

SOME ACCOUNT OF THE HABITS OF FISHES BELONGING TO THE GENUS SALMO.

By SIR HUMPHRY DAVY, BART.,
LATE PRESIDENT OF THE ROYAL SOCIETY.

———"Equidem credo quia sit divinitus illis
Ingenium."

FOURTH EDITION, WITH ILLUSTRATIONS.

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1851.

BY THE SAME AUTHOR.

CONSOLATIONS IN TRAVEL; OR, THE LAST DAYS OF A PHILOSOPHER.

Fifth Edition. Illustrated with Woodcuts. Fcap. 8vo.

ADVERTISEMENT TO THE FOURTH EDITION.

This Edition is printed from a copy of Salmonia which had been revised by the Author shortly before his decease. The few alterations, additions, and omissions which have been made, are either chiefly from his dictation, or in compliance with instructions expressed by him at the time.

Some Notes are subjoined and appended, most of them relating to facts recently ascertained; they are distinguished by being inserted in brackets, and by the initials of the Editor.

J. D.

Lesketh How, Ambleside,
Dec. 7th, 1850.

PREFACE.

THESE pages formed the occupation of the Author during some months of severe and dangerous illness, when he was wholly incapable of attending to more useful studies, or of following more serious pursuits. They constituted his amusement in many hours which otherwise would have been unoccupied and tedious; and they are published in the hope that they may possess an interest for those persons who derive pleasure from the simplest and most attainable kind of rural sports, and who practise the art, or patronise the objects of contemplation, of the Philosophical Angler.

The conversational manner and discursive style were chosen as best suited to the state of health of the Author, who was incapable of considerable efforts

and long-continued attention; and he could not but have in mind a model, which has fully proved the utility and popularity of this method of treating the subject—*The Complete Angler*, by Walton and Cotton.

The characters, chosen to support these Conversations, are—HALIEUS, who is supposed to be an accomplished fly-fisher; ORNITHER, who is to be regarded as a gentleman generally fond of the sports of the field, though not a finished master of the art of angling; POIETES, who is to be considered as an enthusiastic lover of nature, and partially acquainted with the mysteries of fly-fishing; and PHYSICUS, who is described uninitiated as an angler, but as a person fond of inquiries in natural history and philosophy.

These personages are of course imaginary, though the sentiments attributed to them, the Author may sometimes have gained from recollections of real conversations with friends, from whose society much of the happiness of his early life has been derived; and in the portrait of the character of HALIEUS, given in the last dialogue, a likeness, he thinks, will not fail to be recognised to that of the character of a

most estimable Physician, ardently beloved by his friends, and esteemed and venerated by the public.*

He has limited his description of fish to the varieties of the Salmo most usual in the fresh waters of Europe, and which may be defined as a genus having eight fins, the one above the tail fleshy, and without spines.

It is to be hoped M. Cuvier's new work on fishes will supply accurate information on this genus, which is still very imperfectly known.

LAYBACH, ILLYRIA.
Sept. 30*th*, 1828.

[* That excellent man the late Dr. Babington, to whom the first edition was dedicated, "in remembrance of some delightful days passed in his society, and in gratitude for an uninterrupted friendship of a quarter of a century." It should be kept in mind, however, that it is in the last Dialogue only that the likeness is sustained. In the other Dialogues, the personages are not to be identified with any individuals entirely; though here and there, in the sentiments expressed, and the pursuits attributed to them, features of likeness of distinguished friends of the Author may be traced. This is mentioned as, notwithstanding the caution in the text, I have been more than once asked who are the originals represented; the disposition on the part of readers seeming to be, to consider each throughout as a portrait.—J. D.]

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SALMONIA;

OR,

DAYS OF FLY FISHING.

FIRST DAY.

HALIEUS—POIETES—PHYSICUS—ORNITHER.

INTRODUCTORY CONVERSATION—SYMPOSIAC.

Scene, London.

PHYS.—HALIEUS, I dare say you know where this excellent trout was caught: I never ate a better fish of the kind.

HAL.—I ought to know, as it was this morning in the waters of the Wandle, not ten miles from the place where we sit, and it is through my means that you see it at table.

PHYS.—Of your own catching?

HAL.—Yes, with the artificial fly.

PHYS.—I admire the fish, but I cannot admire the art by which it was taken; and I wonder how a man of your active mind and enthusiastic character can enjoy what appears to me a stupid and melancholy occupation.

HAL.—I might as well wonder in my turn, that a man of your discursive imagination and disposition to contemplate should not admire this occupation, and that you should venture to call it either stupid or melancholy.

PHYS.—I have at least the authority of a great moralist, Johnson, for its folly.

HAL.—I will allow no man, however great a philosopher, or moralist, to abuse an occupation he has not tried; and as well as I remember, this same illustrious person praised the book and the character of the great Patriarch of Anglers, Isaac Walton.

PHYS.—There is another celebrated man, however, who has abused this your patriarch, Lord Byron, and that in terms not very qualified. He calls him, as well as I can recollect, "a quaint old cruel cox-

comb." * I must say, a practice of this great fisherman, where he recommends you to pass the hook through the body of a frog with care, as though you loved him, in order to keep him alive longer, cannot but be considered as cruel.

HAL.—I do not justify either the expression or the practice of Walton in this instance; but remember, *I* fish only with inanimate baits, or imitations of them, and I will not exhume or expose the ashes of the dead, nor vindicate the memory of Walton, at the expense of Byron, who, like Johnson, was no fisherman: but the moral and religious habits of Walton, his simplicity of manners, and his well-spent life, exonerate him from the charge of cruelty; and the book of a coxcomb would not have been so great a favourite with most persons of refined taste. A noble lady, long distinguished at court for pre-eminent beauty and grace, and whose mind possesses undying charms, has written some lines in my copy of Walton, which, if you will allow me, I will repeat to you:

Albeit, gentle Angler, I
Delight not in thy trade,

* From DON JUAN, Canto XII. Stanza CVI.

"And angling, too, that solitary vice,
Whatever Izaac Walton sings or says:
The quaint old cruel coxcomb in his gullet
Should have a hook and a small trout to pull it."

Yet in thy pages there doth lie
So much of quaint simplicity,
So much of mind,
Of such good kind,
That none need be afraid,
Caught by thy cunning bait, this book,
To be ensnared on thy hook.

Gladly from thee, I'm lured to bear
With things that seem'd most vile before,
For thou didst on poor subjects rear
Matter the wisest sage might hear.
And with a grace,
That doth efface
More labour'd works, thy simple lore
Can teach us that thy skilful *lines*,
More than the scaly brood *confines*.

Our hearts and senses, too, we see,
Rise quickly at thy master hand,
And, ready to be caught by thee,
Are lured to virtue willingly.
Content and peace,
With health and ease,
Walk by thy side. At thy command
We bid adieu to worldly care,
And joy in gifts that all may share.

Gladly, with thee, I pace along,
And of sweet fancies dream;
Waiting till some inspired song,
Within my memory cherish'd long,
Comes fairer forth,
With more of worth,
Because that time upon its stream
Feathers and chaff will bear away,
But give to gems a brighter ray.

C. C. 1812.

And though the charming and intellectual author of this poem is not an angler herself, yet I can quote the example of her lovely daughters to vindicate fly-fishing from the charge of cruelty, and to prove that the most delicate and refined minds can take pleasure in this innocent amusement. One of these young ladies, I am told, is a most accomplished and skilful salmon fisher. And if you require a poetical authority against that of Lord Byron, I mention the philosophical and powerful poet of the lakes, and the author of

> "An Orphic tale indeed,
> A tale divine, of high and passionate thoughts,
> To their own music chanted;" *

who is a lover both of fly-fishing and fly-fishermen. Gay's poem you know, and his passionate fondness for the amusement, which was his principal occupation in the summer at Amesbury; and the late excellent John Tobin, author of the Honey Moon, was an ardent angler.

PHYS.—I am satisfied with your poetical authorities.

HAL.—Nay, I can find authorities of all kinds, statesmen, heroes, and philosophers. I can go back to Trajan, who was fond of angling. Nelson was † a

* The Friend, page 303, by S. T. Coleridge.

† I have known a person who fished with him at Merton, in the Wandle. I hope this circumstance will be mentioned in the next edition of that most exquisite and touching Life of our Hero, by the Laureate, an immortal monument raised by Genius to Valour.

good fly-fisher, and as a proof of his passion for it, continued the pursuit even with his left hand. Dr. Paley was ardently attached to this amusement; so much so, that when the Bishop of Durham inquired of him, when one of his most important works would be finished, he said, with great simplicity and good humour, "My Lord, I shall work steadily at it when the fly-fishing season is over," as if this were a business of his life. And I am rather reserved in introducing living characters, or I could give a list of the highest names of Britain, belonging to modern times, in science, letters, arts, and arms, who are ornaments of this fraternity, to use the expression borrowed from the freemasonry of our forefathers.

PHYS.—I do not find much difficulty in understanding why warriors, and even statesmen, fishers of men, many of whom I have known particularly fond of hunting and shooting, should likewise be attached to angling; but I own, I am at a loss to find reasons for a love of this pursuit amongst philosophers and poets.

HAL.—The search after food is an instinct belonging to our nature; and from the savage in his rudest and most primitive state, who destroys a piece of game, or a fish, with a club or spear, to man in the most cultivated state of society, who employs artifice, machinery, and the resources of various other animals, to secure his object, the origin of the pleasure is similar,

and its object the same: but that kind of it requiring most art may be said to characterise man in his highest or intellectual state; and the fisher for salmon and trout with the fly employs not only machinery to assist his physical powers, but applies sagacity to conquer difficulties; and the pleasure derived from ingenious resources and devices, as well as from active pursuit, belongs to this amusement. Then, as to its philosophical tendency, it is a pursuit of moral discipline, requiring patience, forbearance, and command of temper. As connected with natural science, it may be vaunted as demanding a knowledge of the habits of a considerable tribe of created beings—fishes, and the animals that they prey upon, and an acquaintance with the signs and tokens of the weather and its changes, the nature of waters, and of the atmosphere. As to its poetical relations, it carries us into the most wild and beautiful scenery of nature, amongst the mountain lakes, and the clear and lovely streams that gush from the higher ranges of elevated hills, or that make their way through the cavities of calcareous strata. How delightful in the early spring, after the dull and tedious time of winter, when the frosts disappear and the sunshine warms the earth and waters, to wander forth by some clear stream, to see the leaf bursting from the purple bud, to scent the odours of the bank perfumed by the violet, and enamelled, as it were,

with the primrose and the daisy; to wander upon the fresh turf below the shade of trees, whose bright blossoms are filled with the music of the bee; and on the surface of the waters to view the gaudy flies sparkling like animated gems in the sunbeams, whilst the bright and beautiful trout is watching them from below; to hear the twittering of the water-birds, who, alarmed at your approach, rapidly hide themselves beneath the flowers and leaves of the water-lily; and as the season advances, to find all these objects changed for others of the same kind, but better and brighter, till the swallow and the trout contend as it were for the gaudy May-fly, and till in pursuing your amusement in the calm and balmy evening, you are serenaded by the songs of the cheerful thrush and melodious nightingale, performing the offices of paternal love, in thickets ornamented with the rose and woodbine.

PHYS.—All these enjoyments might be obtained without the necessity of torturing and destroying an unfortunate animal, that the true lover of nature would wish to see happy in a scene of loveliness.

HAL.—If all men were Pythagoreans and professed the Brahmin's creed, it would undoubtedly be cruel to destroy any form of animated life; but if fish are to be eaten, I see no more harm in capturing them by skill and ingenuity with an artificial fly, than in pulling

them out of the water by main force with the net; and in general when taken by the common fisherman, fish are permitted to die slowly, and to suffer in the air, from the want of their natural element; whereas, every good angler, as soon as his fish is landed, either destroys his life immediately, if he is wanted for food, or returns him into the water.

PHYS.—But do you think nothing of the torture of the hook, and the fear of capture, and the misery of struggling against the powerful rod?

HAL.—I have already admitted the danger of analysing, too closely, the moral character of any of our field-sports; yet I think it cannot be doubted that the nervous system of fish, and cold-blooded animals in general, is less sensitive than that of warm-blooded animals. The hook usually is fixed in the cartilaginous part of the mouth, where there are no nerves; and a proof that the sufferings of a hooked fish cannot be great is found in the circumstance, that though a trout has been hooked and played for some minutes, he will often, after his escape with the artificial fly in his mouth, take the natural fly, and feed as if nothing had happened; having apparently learnt only from the experiment, that the artificial fly is not proper food. And I have caught pikes with four or five hooks in their mouths, and tackle which they had broken only a few minutes before; and the hooks

seemed to have had no other effect than that of serving as a sort of *sauce piquante*, urging them to seize another morsel of the same kind.

PHYS.—Fishes are mute, and cannot plead, even in the way that birds and quadrupeds do, their own cause; yet the instances you quote only prove the intense character of their appetites, which seem not so moderate as Whiston imagined, in his strange philosophical romance on the Deluge; in which he supposes, that in the antediluvian world the heat was much greater than in this, and that all terrestrial and aerial animals had their passions so exalted by this high temperature, that they were lost in sin, and destroyed for their crimes; but that fish living in a cooler element, were more correct in their lives, and were therefore spared from the destruction of the primitive world. You have proved, by your examples, the intensity of the appetite of hunger in fishes; Spalanzani has given us another proof of the violence of a different appetite, or instinct, in a cold-blooded animal, that has most of the habits of the genus—the frog; which, in the breeding season, remains attached to the female, though a limb, or even his head, is removed from the body.

HAL.—This is likewise in favour of my argument, that the sensibility of this class of animals to physical pain is comparatively small.

PHYS.—The advocates for a favourite pursuit never want sophisms to defend it. I have even heard it asserted, that a hare enjoys being hunted. Yet I will allow that fly-fishing, after your vindication, appears amongst the least cruel of field-sports:—I can go no farther; as I have never thought of trying it, I can say nothing of its agreeableness as an amusement, compared with hunting and shooting.

HAL.—I wish that you would allow me to convince you, that for a contemplative man, as you are, and a lover of nature, it is far superior, more tranquil, more philosophical, and, after the period of early youth, more fitted for a moderately active body and mind, requiring less violent exertion; and pursued with discretion, affording an exercise conducive to health. There is a river, only a few miles off, where I am sure I could obtain permission for you, and our friend Poietes, to fish.

PHYS.—I am open to conviction on all subjects, and have no objection to spend one May-day with you in this idle occupation; premising, that you take at least one other companion, who really loves fishing.

HAL.—You, who are so fond of natural history, even should you not be amused by fishing, will, I am sure, find objects of interest on the banks of the river.

PHYS.—I fear I am not entomologist enough to follow the life of the May-fly, but I shall willingly

have my attention directed to its habits. Indeed, I have often regretted that sportsmen were not fonder of zoology; they have so many opportunities, which other persons do not possess, of illustrating the origin and qualities of some of the most curious forms of animated nature, the causes and character of the migrations of animals, their relations to each other, and their place and order in the general scheme of the universe. It has always appeared to me, that the two great sources of change of place of animals, were the providing of food for themselves, and resting-places and food for their young. The great supposed migrations of herrings from the pole to the temperate zone have appeared to me to be only the approach of successive shoals from deep to shallow water, for the purpose of spawning. The migrations of salmon and trout are evidently for the purpose of depositing their ova, or of finding food after they have spawned. Swallows, and bee-eaters, decidedly pursue flies over half the globe. The scolopax or snipe tribe, in like manner, search for worms and larvæ,—flying from those countries where either frost or dryness prevents them from boring,—making generally small flights at a time, and resting on their travels where they find food. And a journey from England to Africa is no more for an animal that can fly, with the wind, one hundred miles in an hour, than a journey for a

Londoner to his seat in a distant province. And the migrations of smaller fishes or birds always occasion the migration of larger ones, that prey on them. Thus, the seal follows the salmon, in summer, to the mouths of rivers; the hake follows the herring and pilchard; hawks are seen in great quantities, in the month of May, coming into the east of Europe, after quails and land-rails; and locusts are followed by numerous birds, that, fortunately for the agriculturist, make them their prey.

HAL.—It is not possible to follow the amusement of angling, without having your attention often directed to the modes of life of fishes, insects, and birds, and many curious and interesting facts, as it were, forced upon your observation. I consider you (*Physicus*), as pledged to make one of our fishing party; and I hope, in a few days, to give you an invitation to meet a few worthy friends on the banks of the Colne. And you (*Poietes*), who, I know, are an initiated disciple of Walton's school, will, I trust join us. We will endeavour to secure a fine day; two hours, in a light carriage with good horses, will carry us to our ground; and I think I can promise you green meadows, shady trees, the song of the nightingale, and a full and a clear river.

POIET.—This last is, in my opinion, the most poetical object in nature. I will not fail to obey your

summons. Pliny has, as well as I recollect, compared a river to human life. I have never read the passage in his works, but I have been a hundred times struck with the analogy, particularly amidst mountain scenery. The river, small and clear in its origin, gushes forth from rocks, falls into deep glens, and wantons and meanders through a wild and picturesque country, nourishing only the uncultivated tree or flower by its dew or spray. In this, its state of infancy and youth, it may be compared to the human mind in which fancy and strength of imagination are predominant;—it is more beautiful than useful. When the different rills or torrents join, and descend into the plain, it becomes slow and stately in its motions; it is applied to move machinery, to irrigate meadows, and to bear upon its bosom the stately barge;—in this mature state, it is deep, strong, and useful. As it flows on towards the sea, it loses its force and its motion, and at last, as it were, becomes lost, and mingled with the mighty abyss of waters.

HAL.—One might pursue the metaphor still further, and say, that in its origin—its thundering and foam, when it carries down clay from the bank, and becomes impure, it resembles the youthful mind, affected by dangerous passions. And the influence of a lake, in calming and clearing the turbid water, may be compared to the effect of reason in more mature life, when

the tranquil, deep, cool and unimpassioned mind is freed from its fever, its troubles, bubbles, noise and foam. And, above all, the sources of a river—which may be considered as belonging to the atmosphere—and its termination in the ocean, may be regarded as imaging the divine origin of the human mind, and its being ultimately returned to and lost in the Infinite and Eternal Intelligence from which it originally sprung.

Denham.

SECOND DAY.

HALIEUS—POIETES—ORNITHER—PHYSICUS.

TROUT FISHING, DENHAM.—MAY, 1810.

Morning.

HAL.—I am delighted to see you, my worthy friends, on the banks of the Colne; and am happy to be able to say, that my excellent host has not only made you free of the river for this day's angling, but insists upon your dining with him,—wishes you to try the evening fishing, and the fishing to-morrow morning,—and propòses to you, in short, to give up twenty-four hours to the delights of an angler's May-day.

POIET.—We are deeply indebted to him; and I hardly know how we can accept his offer, without laying ourselves under too great an obligation.

HAL.—Fear not: he is as noble-minded a man as ever delighted in good offices; and so benevolent, that I am sure he will be almost as happy in knowing you are amused, as you can be in your sport; and he hopes for an additional satisfaction in the pleasure of your conversation.

POIET.—So let it be.

HAL.—I will take you to the house; you shall make your bow, and then you will be all free to follow your own fancies. Remember, the dinner hour is five; the dressing bell rings at half-past four; be punctual to this engagement, from which you will be free at seven.

POIET.—This is really a very charming villa scene, I may almost say, a pastoral scene. The meadows have the verdure which even the Londoners enjoy as a peculiar feature of the English landscape. The river is clear, and has all the beauties of a trout stream of the larger size,—there rapid, and here still, and there tumbling in foam and fury over abrupt dams upon clean gravel, as if pursuing a natural course. And that island with its poplars and willows, and the flies making it their summer paradise, and its little fishing-house, are all in character; and if not ex-

tremely picturesque, it is at least a very pleasant scene, from its verdure and pure waters, for the lovers of our innocent amusement.

HAL.—It is ten o'clock: you may put up your rods, or take rods from the hall; for so hospitable is the master of this mansion, that everything is supplied to our hands. And Physicus, as you are the only one of our party ignorant of the art of fly-fishing, I will fit you with a rod and flies; and let me advise you to begin with a line shorter than your rod, and throw at first slowly and without effort, and imitate us as well as you can. As for precepts, they are of little value; practice and imitation will make you an angler.

POIET.—I shall put together my rod, and fish with my own flies. It may be fancy, but I always think I do best with tackle with which I am used to fish.

HAL.—You are right; for fancy is always something: and when we believe that we can do things better in a particular way, we really do, by the influence of imagination, perform them both better and with less effort. I agree with moralists, that the standard of virtue should be placed higher than any one can reach; for in trying to rise, man will attain a more excellent state of being than if no effort were made. But to our business. As far as the perfection of the material for the angler is concerned, the flies you find on this table are as good as can be made, and for this season of the year, there

is no great variety on this river. We have had lately some warm days, and though it is but the 18th of May, yet I know the May-fly has been out for three or four days, and this is the best period of this destructive season for the fisherman. There are, I observe, many male flies on the high trees, and some females on the alders.

PHYS.—But I see flies already on the water, which seem of various colours,—brown and gray, and some very pale,—and the trout appear to rise at them eagerly.

HAL.—The fly you see is called by fishermen the alder fly, and appears generally in large quantities before the May-fly. Imitations of this fly, and of the green and the gray drake, of different shades, are the only ones you will need this morning, though I doubt if the last can be much used, as the gray drake is not yet on the water in any quantity.

PHYS.—Pray can you give us any account of these curious little animals?

HAL.—We ought to draw upon your stores of science for information on these subjects.

PHYS.—I really know nothing of Entomology, but I am desirous of acquiring knowledge.

HAL.—I have made few observations on flies as a philosophical naturalist. What I know I will state at another time. But see, the green drake is descending

upon the water, and some are leaving the alders to sport in the sunshine, and to enjoy the pleasures of their brilliant, though short existence; and their life, naturally ephemeral, is made one of scarcely a moment, by the fishes and birds: that which the swallow or the duck spares is caught by the fish. The fly is new, and in the imitation, I recommend the olive tint, or what the Irish call the green monkey;—that is, an artificial fly, with a wing of dyed yellow drake's feather, a body of yellow monkey's fur, and a small quantity of olive mohair for legs. For myself, I shall fish for some time with a large red alder-fly, and I dare say, with as much success;—that is, with a fly with a dark peacock's harle for body, a red hackle for legs, and wings of the land-rail below, and starling above.

POIET.—The water is quite in motion: what noble fish I see on the feed! I never beheld a finer sight, though I have often seen the May-fly on well-stocked waters.

HAL.—This river is most strictly preserved; not a fish has been killed here since last August, and this is the moment when the large fish come to the surface, and leave their cad bait search and minnow hunting. But I have hardly time to talk; I have hold of a good fish: they take either the alder or May-fly, and having never been fished for this year, they make no distinction, and

greedily seize any small object in motion on the water. You see the alder-fly is quite as successful as the May-fly; but there is a fish which has refused it, and because he has been feeding, glutton-like, on the May-fly: that is the fifth he has swallowed in a minute. Now I shall throw the drake a foot above him. It floats down, and he has taken it. A fine fish; I think at least 4lbs. This is the largest fish we have yet seen, but in the deep water still lower down, there are still greater fish. One of 5 lbs. I have known taken here, and once a fish a little short only of 6lbs.

POIET.—I have just landed a fish which I suppose you will consider as a small one; yet I am tempted to kill him.

HAL.—He is not a fish to kill; throw him back, he is much under 2lbs., and, as I ought to have told you before, we are not allowed to kill any fish of less size; and I am sure we shall all have more than we ought to carry away even of this size. Pray put him into the well, or rather give him to the fisherman to turn back into the water.

POIET.—I cannot say I approve of this manner of fishing; I lose my labour.

HAL.—As the object of your fishing, I hope, is innocent amusement, you can enjoy this, and show your skill in catching the animal; and if every fish that took the May-fly were to be killed, there would

be an end to the sport in the river, for none would remain for next year.

PHYS.—The number of flies seems to increase as the day advances, and I never saw a more animated water scene: all nature seems alive; even the water-wagtails have joined the attack upon these helpless and lovely creations from the waters.

HAL.—It is now one o'clock; and between twelve and three is the time when the May-fly rises with most vigour. It is a very warm day, and with such a quantity of fly, every fish in the river will probably be soon feeding. See, below the wear, there are two large trout lately come out; and from the quiet way in which they swallow their prey, and from the size of the tranquil undulation that follows their rise, I suspect they are the giants of this river. Try if you cannot reach them: one is near the bank in a convenient place for a throw, for the water is sufficiently rough to hide the deception, and these large fish do not take the fly well in calm water, though with natural flies on the hook they might all be raised.

POIET.—I have him! Alas! he has broken me, and carried away half my bottom line. He must have been a fish of 7 or 8lbs. What a dash he made! He carried off my fly by main force.

HAL.—You should have allowed your reel to play and your line to run: you held him too tight.

POIET.—He was too powerful a fish for my tackle; and even if I had done so, would probably have broken me by running amongst the weeds.

HAL.—Let me tell you, my friend, you should never allow a fish to run to the weeds, or to strike across the stream; you should carry him always down stream, keeping his head high, and in the current. If in a weedy river you allow a large fish to run up stream, you are almost sure to lose him. There, I have hooked the companion of your lost fish on the other side of the stream,—a powerful creature: he tries, you see, to make way to the weeds, but I hold him tight.

POIET.—I see you are obliged to run with him, and have carried him safely through the weeds.

HAL.—I have him now in the rapids on the shallow, and I have no fear of losing him, unless he strikes the hook out of his mouth.

POIET.—He springs again and again.

HAL.—He is off; in one of these somersets he detached the steel, and he now leaps to celebrate his escape. We will leave this place, where there are more great fish, and return to it after a while, when the alarm produced by our operations has subsided.

PHYS.—That fish take the artificial fly at all is rather surprising to me, for in its most perfect form

it is but a rude imitation of nature; and from the greedy manner in which it is seized, fish, I think, cannot possess a refined sense of smell, or any nervous system corresponding to the nasal one in animals that breathe air: no scent can be given to water by an artificial fly, or, at least, none like that of the natural fly.

HAL.—The principal use of the nostrils in fishes, I believe, is to assist in the propulsion of water through the gills for performing the office of respiration; but I think there are some nerves in these organs which give fishes a sense of the qualities of the water, or of substances dissolved in, or diffused through it, similar to our sense of smell, or, perhaps, rather our sense of taste, for there can be no doubt that fishes are attracted by scented pastes and scented worms, which are sometimes used by anglers that employ ground-baits; and in old angling-books there are usually receipts for attracting fish in this manner, and though the absurdity of many of these prescriptions is manifest, yet I do not think this proves that they are entirely useless, for, upon such principles, all the remedies for diseases in the old pharmacopœias would be null.*

* [That the olfactory nerves in fishes are destined for the same function as these nerves in the mammalia, seems hardly to admit of doubt, especially considering the fact, that *we* can perceive odours when the head is immersed in water: this is easily proved by plunging the head in water to which some eau de Cologne or other scent has been added; on drawing in the water through the nostrils, the peculiar odour (as I have ascertained) is distinctly perceived.—J. D.]

With respect to the fly, as it usually touches the stream by a very small surface, that of the air-bubbles on the fringes on its legs, it can scarcely affect the water so as to give it any power of communicating smell. And as you have seen, a ripple or motion on the water is necessary to deceive fishes; and as they look at the fly from below, they see distinctly only the legs and body, which, when the colours are like those of the natural fly, may easily deceive them; the wings, which are the worst imitated parts of the artificial fly, seldom appear to them, except through the different refractive power of the moving water and the atmosphere, and when immersed, they form masses not unlike the wings of a drowned fly, or one wetted in rising.*

* * * * *

It is now a quarter of an hour since we left the large pool: let us return to it; I see the fish are again rising.

* [In confirmation of the above view, an anecdote may be given illustrating the discriminating power of the trout, communicated in conversation by the excellent author of "The British Fishes." In the neighbourhood of Gravesend, in a cottage-garden, some Trouts have been kept, which have become almost tame and of large size, which visitors are in the habit of feeding for amusement. Frogs which Mr. Yarrell had thrown in, for want of other food to give them, they seized instantly, and swallowed unhesitatingly,—but not so, a toad; when it was thrown in, they dashed towards it, but retreated before touching it, leaving it afterwards free and unmolested, as if aware of its "sweltered venom."—J. D.]

POIET.—I am astonished! It appears to me that the very same fish are again feeding. There are two fish rising nearly in the same spot where they rose before; can they be the same fish?

HAL.—It is very possible. It is not likely that three other fish of that size should occupy the same haunts.

POIET.—But I thought after a fish had been hooked, he remained sick and sulky for some time, feeling his wounds uncomfortable.

HAL.—The fish that I hooked is not rising in the same place, and therefore, probably, was hurt by the hook; but one of these fish seems to be the same that carried off your fly, and it is probable that the hook only struck him in a part of the mouth where there are no nerves; and that he suffered little at the moment, and does not now feel his annoyance.

POIET.—I have seen him take four or five flies: I shall throw over him. There, he rose, but refused the fly. He has at least learnt, from the experiment he has made, to distinguish the natural from the artificial fly.

HAL.—This, I think, always happens after a fish has been hooked with an artificial fly. He becomes cautious, and is seldom caught that year, at least with the same means in the same pool: but I dare say that fish might be taken with a natural fly; or, what is better, two upon the hook.

POIET.—Pray try him.

HAL.—I am no artist at this kind of angling, but Ornither I know has fished in June with the clubs at Stockbridge, where this method of fishing is usual. Pray let him try his fortune, though it is hardly fair play; and it is rather to endeavour to recover your tackle, than for the sake of the fish, that I encourage him to make the essay.

POIET.—Pray make no apologies for the trial. Such a fish—certainly a monster for this river—should be caught by fair means, if possible, but caught by any means.

ORN.—You lost that fish, and you overrate his size, as you will see, if I have good luck. I put my live flies on the hook with some regret and some disgust. I will not employ another person to be my minister of cruelty, as I remember a lady of fashion once did, who was very fond of fishing for perch, and who employed her daughter, a little girl of nine years of age, to pass the hook through the body of the worm! Now there is a good wind, and the fish has just taken a natural fly. I shall drop the flies, if possible, within a few inches of his nose. He has risen. He is caught! I must carry him down stream to avoid the bed of weeds above. I now have him on fair ground, and he fights with vigour. Fortunately, my silkworm gut is very strong, for he is not a fish to be

trifled with. He begins to be tired; prepare the net. We have him safe, and see your link hangs to his lower jaw: the hook had struck the cartilage on the outside of the bone, and the fly, probably, was scarcely felt by him.

PHYS.—I am surprised! That fish evidently had discovered that the artificial fly was a dangerous bait, yet he took the natural fly which was on a hook, and when the silkworm gut must have been visible.

HAL.—I do not think he saw either the gut or the hook. In very bright weather and water, I have known very shy fish refuse even a hook baited with the natural fly, scared probably by some appearance of hook or gut. The vision of fishes when the surface is not ruffled is sufficiently keen. I have seen them rise at gnats so small as to be scarcely visible to my eye.*

PHYS.—You just now said, that a fish pricked by the hook of an artificial fly would not usually take it again that season.

HAL.—I cannot be exact on that point: I have known a fish that I have pricked retain his station in the river, and refuse the artificial fly, day after day,

* [If the stomach of a trout be examined when flies are abundant, often very many different species will be found amongst its contents, large and small, some so small as to be distinguished with difficulty; marking equally the acuteness of vision of the fish and its industry and pains-taking in procuring sustenance.—J. D.]

for weeks together; but his memory may have been kept awake by this practice, and the recollection seems local and associated with surrounding objects; and if a pricked trout is chased into another pool, he will, I believe, soon again take the artificial fly. Or if the objects around him are changed, as in Autumn, by the decay of weeds, or by their being cut, the same thing happens; and a flood, or a rough wind, I believe, assists the fly-fisher, not merely by obscuring the vision of the fish, but, in a river much fished, by changing the appearance of their haunts: large trouts almost always occupy particular stations, under, or close to, a large stone or tree; and, probably, most of their recollected sensations are connected with this dwelling.

PHYS.—I think I understand you, that the memory of the danger and pain does not last long, unless there is a permanent sensation with which it can remain associated,—such as the station of the trout; and that the recollection of the mere form of the artificial fly, without this association, is evanescent.

ORN.—You are diving into metaphysics; yet I think, in fowling, I have observed that the memory of birds is local. A woodcock, that has been much shot at and scared in a particular wood, runs to the side where he has usually escaped, the moment he hears the dogs; but if driven into a new wood, he

seems to lose his acquired habits of caution, and becomes stupid.

POIET.—This great fish, that Ornither has just caught, must be nearly of the weight I assigned to him.

HAL.—Oh no! he is, I think, above 5 lbs., but not 6 lbs.; but we can form a more correct opinion by measuring him, which I can easily do, the butt of my rod being a measure. He measures, from nose to fork, a very little less than twenty-four inches, and consequently, upon the scale which is appropriate to well-fed trouts, should weigh 5 lbs. 10 oz.—which, within an ounce, I doubt not, is his weight.

Trout from the Colne.

PHYS.—Oh! I see you take the mathematical law, that similar solids are to each other in the triplicate ratio of one of their dimensions.

HAL.—You are right.

PHYS.—But I think you are below the mark, for this appears to me to be an extraordinarily thick fish.

HAL.—He is a well-fed fish, but, in proportion, not so thick as my model, which was a fish of 17 inches by nine inches, and weighed 2 lbs.;—this is my standard solid. We will try him. Ho! Mrs. B.!—bring your scales, and weigh this fish. There, you see, he weighs 5 lbs. 10 ½oz.

PHYS.—Well, I am pleased to see this fish, and amused with your sport; but though I have been imitating you in throwing the fly, as well as I can, yet not a trout has taken notice of my fly, and they seem scared by my appearance.

HAL.—Let me see you perform. There are two good trout taking flies opposite that bank, which you can reach. You threw too much line into the water, and scared them both; but I will take you to the rapid of the Tumbling Bay, where the river falls; there the quickness of the stream will prevent your line from falling deep, and the foam will conceal your person from the view of the fish. And let me advise you to fish only in the rapids till you have gained some experience in throwing the fly. There are several fish rising in that stream.

PHYS.—I have raised one, but he refused my fly

HAL.—Now you have a fish.

PHYS.—I am delighted;—but he is a small one.

HAL.—Unluckily, it is a *dace*.

PHYS.—I have now a larger fish, which has pulled my line out.

HAL.—Give him time. That is a good trout. Now wind up; he is tired, and your own. I will land him. He is a fish to keep, being above 2 lbs.

PHYS.—I am well pleased.

HAL.—There are many larger trouts here: go on fishing, and you will hook some of them. And when you are tired of this rapid, you will find another a quarter of a mile below. And continue to fish with a short line, and drop your fly, or let it be carried by the wind on the water, as lightly as possible. Well, Poietes, what success?

POIET.—I have been fishing in the stream above; but the flies are so abundant, that the large fish will not take my artificial fly, and I have caught only three fish, all of which the fisherman has thrown into the water, though I am sure one of them was more than 2 lbs.

HAL.—You may trust his knowledge: with a new angler, our keeper would be apt rather to favour the fisherman than the fish. But we will have all fish you wish to be killed, and above 2 lbs., put into the well of the boat, where they can be examined, and, if you desire, weighed and measured, and such kept as are worth keeping. No good angler should kill a fish, if

possible, till he is needed to be crimped; for the sooner he is dressed after this operation the better;—and I assure you, a well-fed trout of the Colne, crimped and cooled ten minutes before he is wanted for the kettle or the gridiron, is a fish little inferior to the best salmon of the best rivers. It is now nearly two o'clock, and there is a cloud over the sun: the fly is becoming less abundant; you are now likely, Poietes, to have better sport. Try in that deep pool below the Tumbling Bay; I see two or three good fish rising there, and there is a lively breeze. The largest fish refuses your fly again and again; try the others. There, you have hooked him! now carry him down stream, and keep his head high, out of the weeds. He plunges and fights with great force;—he is the best-fed fish I have yet seen at the end of the line, and will weigh more, in proportion to his length. I will land him for you. There he is,—and measures 19 inches; and I dare say his weight is not much short of 3 lbs. We will preserve him in the well.

POIET.—He has hardly any spots, and is silvery all over; and the whole of the lower part of his body is beautifully clean.

HAL.—He is likewise broad-backed; and you may observe his few spots are black, and these are very small. I have always remarked, in this river, that the nearer the fish approach to perfection, the colour

of the body becomes more uniform,—pale olive above, and bright silver below; and these qualities are always connected with a small head,—or rather, an oval body, and deep-red flesh.

POIET.—May not the red spots be marks of disease —a hectic kind of beauty? for I observed in a very thin and poor fish, and great-headed, that I caught an hour ago, which had leeches sticking to it, a number of red spots, and a long black back, and black or bluish marks even on the belly.

HAL.—I do not think red spots a symptom of disease; for I have seen fish in other rivers, and even small fish in this river, in perfectly good season, with red spots; but the colours of fish are very capricious, and depend upon causes which cannot be easily defined. The colouring matter is not in the scales, but in the surface of the skin immediately beneath them, and is probably a secretion easily affected by the health of the animal. I have known fish, from some lakes in Ireland, mottled in a most singular way,—their colour being like that of the tortoise; the nature of the water, exposure to the light, and probably the kind of food, produce these effects. I think it possible, when trout feed much on hard substances, such as larvæ and their cases, and the ova of other fish, they have more red spots, and redder fins. This is the case with the gillaroo and the char, who feed

on analogous substances; and the trout, that have similar habits, might be expected to resemble them.

Trout from the Wandle.

When trout feed most on small fish, as minnows, and on flies, they have more tendency to become spotted with small black spots, and are generally more silvery. The Colne trout are, in their advanced state, of this kind; and so are the trout called in Ireland buddocks and dolochans, found in Lough Neah. Particular character becomes hereditary, and the effects of a peculiar food influence the appearance of the next generation. I hope, Ornither, you have had good sport.

ORN.—Excellent! Since you left me, below the wear, I have hooked at least fifteen or twenty good fish, and landed and saved eight above 2lbs.; but I have taken no fish like the great one which I caught

by poaching with the natural flies. The trout rose wonderfully well within the last quarter of an hour, but they are now all still; and the river, which was in such active motion, is now perfectly quiet, and seems asleep and almost dead.

HAL.—It is past four o'clock, and some dark, heavy clouds are come on,—the fly is off. It is almost the hour for the signal of the dressing bell; and there is nothing more to be done now till evening. But see! our host is come to examine our fish in the well, and to inquire about our sport; and, I dare say, will order some of our fish to be dressed for the table.

HOST.—I hope, gentlemen, you have been amused?

HAL.—Most highly, sir. As a proof of it, there are in the fish-well eighteen good trout,—and one not much short of 6lbs.; three above 4lbs.; and four above 3lbs. in weight. I hope you will order that great fish for your dinner.

HOST.—We will see. He is a fine fish, and fit for a present, even for a prince—and you shall take him to a prince. Here is a fish, and there another, of the two next sizes, which I am sure will cut red. Prepare them, fisherman. And, Halieus, you shall catch two or three perch, for another dish; I know there are some good ones below the piles of the wear; I saw them hunting small fish there yesterday

morning. Some minnows, ho!—and the perch rods!

HAL.—I am tired, sir, and would willingly avoid minnow fishing after such a morning's sport.

HOST.—Come, then, I will be a fisher for the table. I have one—and another, that will weigh nearly a pound a-piece. Now, there is a cunning perch that has stolen my minnow; I know he is a large one. He has robbed me again and again; and if I fish on in this way, with the hook through the upper lip, will, I dare say, carry away all the minnows in the kettle. I shall put on a strong small hook, on a stout, though fine, gut, with slender wire round the top, and pass the hook through the back fin of the minnow, and try my sagacity against his. Lo! I have him!—and a very strong fish he is, and gone to the bottom; but even though the greatest perch in the river, he cannot bite the gut,—he will soon be tired and taken. He now comes up, and is landed. He must be above 3lbs.—a magnificent perch! Kill him and crimp him, fisherman; take our two trout, and the three perch, to the kitchen, and let them be dressed as usual. You shall have a good dish of fish, worthy of such determined anglers. But I see one of your party coming up by the side of the river, who seems tired and out of spirits.

HAL.—It is Physicus, who has this day commenced

his career as a fly-fisher, and who, I dare say, has been as successful as the uninitiated generally are. I hope you have followed my advice, and been fortunate?

PHYS.—I caught two trout in the rapid where you left me; but they were small, and the fisherman threw them in. Below the wear, in the quick stream, I caught two dace, and, what astonished me very much, a perch, which you see here, and which I thought never took the fly.

HAL.—O yes, sometimes; and particularly when it is below the surface: and what more?

PHYS.—By creeping on my knees, and dropping my fly over the bank, I hooked a very large fish which I saw rising, and which was like a salmon; but he was too strong for my tackle, ran out all my line, and at last broke off by entangling my link in a post in the river. I have been very unlucky! I am sure that fish was larger than the great one Ornither took with the natural fly.

HAL.—Come, you have been initiated, and I see begin to take an interest in the sport, and I do not despair of your becoming a distinguished angler.

PHYS.—With time and some patience: but I am sorry I tortured that enormous fish without taking him.

HAL.—I dare say he was a large fish; but I have

known very correct, and even cool, reasoners in error on a point of this kind. You are acquainted with Chemicus; he is not an ardent fisherman, and certainly not addicted to romance; I will tell you an anecdote respecting him. He accompanied me to this very spot last year, on a visit to our host, and preferred angling for pike to fly-fishing. After the amusement of a morning, he brought back with him to the house one pike, and with some degree of disappointment complained that he had hooked another of an enormous size, which carried off his tackle by main force, and which he was sure must have been above 10 lbs. At dinner, on the table, there were two pikes; one the fish that Chemicus had caught, and another a little larger, somewhat more than 3 lbs. We put some questions as to who had caught this second pike, which we found had been taken by our host, who smiling, and with some kind of mystery, asked Chemicus if he thought it weighed 10 lbs. Chemicus refused to acknowledge an identity between such a fish and the monster he had hooked; when my friend took out of his pocket a paper containing some hooks and tackle carefully wrapped up, and asked Chemicus if he had ever seen such an apparatus. Chemicus owned they were the hooks and tackle the great fish had carried away. "And I found them," said our friend, "in the mouth of that *little* fish

which you see on the table, and which I caught half an hour ago."

HOST.—I answer for the correctness of this anecdote, but I do not sanction its application to the case of our novitiate in angling. I have seen a fish under that bank where he was so unfortunate, which I am sure was above 4lbs., and which I dare say was the subject of his unsuccessful experiment.

POIET.—From what our host has just said, I conclude, Halieus, that fish do not usually change their stations.

HAL.—Large trouts unquestionably do not;—they always hide themselves under the same bank, stone, stock, or weed, as I said this morning before, and come out from their permanent habitations to feed; and when they have fled to their haunt, they may be taken there by the hand; and on this circumstance the practice of tickling trout is founded. A favourite place for a large trout in rivers is an eddy behind a rock or stone, where flies and small fishes are carried by the force of the current: and such haunts are rarely unoccupied; for if a fish is taken out of one of them, his place is soon supplied by another, who quits for it a less convenient situation.

PHYS.—So much knowledge and practice is required to become a proficient, that I am afraid it is too late in life for me to begin to learn a new art.

HAL.—Do not despair. There was—alas! that I must say there was—an illustrious philosopher, who was nearly of the age of fifty before he made angling a pursuit, yet he became a distinguished fly-fisher, and the amusement occupied many of his leisure hours during the last twelve years of his life. He, indeed, applied his pre-eminent acuteness, his science, and his philosophy to aid the resources, and exalt the pleasures of this amusement. I remember to have seen Dr. Wollaston, a few days after he had become a fly-fisher, carrying at his button-hole a piece of caoutchouc, or Indian rubber, when, by passing his silkworm link through a fissure in the middle, he rendered it straight and fit for immediate use. Many other anglers will remember other ingenious devices of my admirable and ever-to-be lamented friend.

(*They go to dinner.*)

* * * * * *

(*They return from the house.*)

EVENING.

HAL.—You have, I am sure, gentlemen, dined well; no one ever dined otherwise in this house. It is a beautiful calm evening, and many fish might be caught where we fished in the morning; but I will take you to another part of the river; you shall each

catch a fish, and then we will give over; for the evening's sport should be kept till a late season,—July or August,—when there is little fly on in the day-time: and it would be spoiling the diversion of our host, to catch or prick all the fish in the upper water; and with a gentleman so truly liberal, and so profuse of his means of giving pleasure to others, no improper liberties should be taken. I shall not fish myself, but shall have my pleasure in witnessing your sport. It must be in a boat, and you must steal slowly up the calm water, and glide like aerial beings on the surface, making no motion in the water, and showing no shadow. Your fly must be an orange or brown palmer with a yellow body; for the gray drake is not yet on the water. The fish here are large, and the river weedy, so you must take care of your fish and your tackle.

POIET.—We have at least passed over half-a-mile of water, and have seen no fish rise; yet there is a yellowish or reddish fly in the air, which moves like a drake, and there are clouds of pale brown flies encircling the alders. Now I think I see a large trout rise below that alder.

HAL.—That is not a trout, for he rises in a different place now, and is probably a large roach or chub; do not waste your time upon him. You may always know a large trout when feeding in the evening. He

rises continuously, or at small intervals,—in a still water almost always in the same place,—and makes little noise,—barely elevating his mouth to suck in the fly, and sometimes showing his back-fin and tail. A large circle spreads around him, but there are seldom any bubbles when he breaks the water, which usually indicate the coarser fish. We will wait a few minutes; I know there must be trout here, and the sun is setting, and the yellow fly, or dun cut, coming on the water. See, beneath that alder is a trout rising, and now there is another thirty yards higher up. Take care, get your line out in another part of the water, and in order, for reaching the fish, and do not throw till you are sure you can reach the spot, and throw at least half-a-yard above the fish.

ORN.—He rose, I suppose, at a natural fly, the moment before my fly touched the water.

HAL.—Try again. You have hooked him, and you have done well not to strike when he rose. Now hold him tight, wind up your line, and carry him down the stream. Push the boat down stream, fisherman. Keep your fish's head up. He begins to tire,—and there, is landed. A fine well-fed fish, not much less than 4 lbs. Throw him into the well. Now, Poietes, try that fish rising above,—and there are two more.

POIET.—I have him!

HAL.—Take care. He has turned you, and you have suffered him to run out your line, and he is gone into the weeds under the willow: let him fall down stream.

POIET.—I cannot get him out.

HAL.—Then wind up. I fear he is lost, yet we will try to recover him by taking the boat up. The line is loose; he has left the link entangled in the weeds, and carried your fly with him. He must have been a large fish, or he could not have disentangled himself from so strong a gut. Try again, there are fish now rising above and below; where the water is in motion, opposite that willow, there are two fish rising.

POIET.—I have one of them.

HAL.—Now you are doing well. Down with the boat, and drag your fish downwards. Continue to do so, as there are weeds all round you. You can master him now; keep him high, and he is your own. Put the net under him, and bring him into the boat; he is a well-fed fish, but not of the proper size for a victim,—about 2 lbs. Now, Physicus, try your fortune with the fish above, that rises so merrily still. You have him! Now use him as Poietes did the last. Very well; I see he is a large fish,—take your time. He is landed; a fish nearly of 3 lbs., and in excellent season.

PHYS.—Anche Io son Pescatore—I too am a fisherman—a triumph.

HAL.—Now we have finished our fishing, and must return to the light supper of our host. It would be easy now, and between this hour and ten, to take half-a-dozen large fish in this part of the water; but for the reason I have already stated, it would be improper.

POIET.—Pray would not this be a good part of the water for day-fishing?

HAL.—Undoubtedly, a skilful angler might take fish here in the day; but the bank is shaded by trees, there is seldom any sensible wind on the water, and the apparatus and the boat in motion are easily perceived in the daylight; and the water is so deep, that a great quantity of fly is necessary to call up the fish; and in general there is a larger quantity of fly in hot summer evenings, than even in the brightest sunshine.

PHYS.—The fly appears to me like a moth that is now on the water.

HAL.—It is.

POIET.—What flies come on late in the season here?

HAL.—Flies of the same species; some darker, and some with a deeper shade of red; and there are likewise the true moths, the brown and white, which,

in June and July, are seized with avidity by the fish, and, being large flies, take large fish.

ORN.—Surely the May-fly season is not the only season for day-fishing in this river?

HAL.—Certainly not. There are as many fish to be taken perhaps in the Spring fishing! but in this deep river they are seldom in good season till the May-fly has been on, and a fortnight hence they will be still better than even now. In September there may be good fish taken here; but the autumnal flies are less plentiful in this river than the Spring flies.

PHYS.—Pray tell me what are the species of fly which take in these two seasons?

HAL.—You know that trout spawn or deposit their ova in the end of the autumn or beginning of winter, from the middle of November till the beginning of January, their maturity depending upon the temperature of the season, their quantity of food, &c. For some time (a month or six weeks) before they are prepared for the sexual function, or that of re-production, they become less fat, particularly the females; the large quantity of eggs and their size probably affecting the health of the animal, and compressing generally the vital organs in the abdomen. They are at least six weeks or two months after they have spawned before they recover their flesh; and the time when these fish are at the worst is likewise the worst

time for fly-fishing, both on account of the cold weather and because there are fewer flies on the water than at any other season. Even in December and January there are a few small gnats or water-flies on the water in the middle of the day, in bright days, or when there is sunshine. These are generally black, and they escape the influence of the frost by the effects of light on their black bodies, and probably by the extreme rapidity of the motions of their fluids, and generally of their organs. They are found only at the surface of the water, where the temperature must be above the freezing point. In February a few double-winged water-flies which swim down the stream are usually found in the middle of the day,—such as the willow-fly; and the cow-dung-fly is sometimes carried on the water by winds. In March there are several flies found on most rivers. The grannam or green-tail-fly, with a wing like a moth, comes on generally morning and evening, from five till eight o'clock A. M. in mild weather in the end of March and through April. Then there are the blue and the brown, both Ephemeræ, which come on, the first in dark days, the second in bright days; these flies, when well imitated, are very destructive to fish. The first is a small fly with a palish-yellow body, and slender beautiful wings, which rest on the back as it floats down the water. The second, called the cob in

Wales, is three or four times as large, and has brown wings, which likewise protrude from the back, and its wings are shaded like those of a partridge, brown and yellow brown. These three kinds of flies lay their eggs in the water, which produce larvæ that remain in the state of worms, feeding and breathing in the water till they are prepared for their metamorphosis and quit the bottoms of the rivers, and the mud and stones, for the surface, and the light and air. The brown fly usually disappears before the end of April, likewise the grannam; but of the blue dun there is a succession of different tints, or species, or varieties, which appear in the middle of the day all the summer and autumn long. These are the principal flies on the Wandle—the best and clearest stream near London. In early spring these flies have dark olive bodies; in the end of April and the beginning of May, they are found yellow; and in the summer, they become cinnamon-coloured; and again, as the winter approaches, gain a darker hue. I do not, however, mean to say that they are the same flies; but more probably successive generations of Ephemeræ of the same species. The excess of heat seems equally unfavourable, as the excess of cold, to the existence of the smaller species of water-insects, which, during the intensity of sunshine, seldom appear in summer, but rise morning and evening only. The blue dun

has in June and July a yellow body; and there is a water-fly which in the evening is generally found before the moths appear, called the red-spinner. Towards the end of August, the Ephemeræ appear again in the middle of the day,—a very pale small Ephemera, which is of the same colour as that which is seen in some rivers in the beginning of July. In September and October this kind of fly is found with an olive body, and it becomes darker in October, and paler in November. There are two other flies which appear in the end of September, and continue during October if the weather be mild,—a large yellow fly with a fleshy body and wings like a moth; and a small fly with four wings, with a dark or claret-coloured body, that when it falls on the water has its wings, like the great yellow fly, flat on its back. This, or a claret-bodied fly very similar in character, may be likewise found in March or April, on some waters. In this river I have often caught many large trout in April and the beginning of May with the blue dun, having the yellow body; and in the upper part of the stream below St. Alban's, and between that and Watford, I have sometimes, even as early as April, caught fish in good condition; but the *true* season for the Colne is the season of the May-fly. The same may be said of most of the large English rivers containing large trouts, and abounding

in May-fly—such as the Test and the Kennet, the one running by Stockbridge, the other by Hungerford. But in the Wandle at Carshalton and Beddington, the May-fly is not found; and the little blues are the constant, and when well imitated, killing flies on this water; to which may be joined a dark alder-fly, and a red evening fly. In the Avon, at Ringwood and Fordingbridge, the May-fly is likewise a killing fly; but as this is a grayling river, the other flies, particularly the grannam and blue and brown, are good in spring, and the alder-fly or pale blue later, and the blue dun in September and October, and even November. In the streams in the mountainous parts of Britain, the spring and autumnal flies are by far the most killing. The Usk was formerly a very productive trout stream, and the fish being well fed by the worms washed down by the winter floods were often in good season, cutting red in March, and the beginning of April; and at this season the blues and browns, particularly when the water was a little stained after a small flood, afforded the angler good sport. In Herefordshire and Derbyshire, where trout and grayling are often found together, the same periods are generally best for angling; but in the Dove, Lathkill, and Wye, with the natural May-fly, many fish may be taken; and in old times, in peculiarly windy days, or high and troubled water,

even the artificial May-fly, according to Cotton, was very killing.

POIET.—I have heard various accounts of the excellent fishing in some of the great lakes in Ireland. Can you tell us anything on the subject? and if the same flies may be used in that island?

HAL.—I have been several times in Ireland, but never at this season, which is considered as best for lake-fishing. I have heard that in some of the lakes in Westmeath, very large trout, and great quantities, may be taken in the beginning of June, with the very flies we have been using this day. Wind is necessary; and a good angler sometimes takes in a day, or rather formerly took, from ten to twelve fish, which weighed from 3 to 10 lbs., and which occasionally were even larger. In the summer after June, and in the autumn, the only seasons when I have fished in Ireland, I have seldom taken any large trout; but in the river Boyle, late in October, after a flood, I once had some sport with these fish, that were running up the river from Lock Key to spawn. I caught one day two above 3 lbs. that took a large reddish-brown fly of the same kind as a salmon-fly; and I saw some taken that weighed 5 lbs., and heard of one that equalled 9 lbs. These fish were in good season, even at this late period, and had no spots, but were coloured red and brown—mottled like tortoise-shell,

only with smaller bars. I have in July, likewise, fished in Loch Con, near Ballina, and Loch Melvin, near Ballyshannon. In Loch Con, the party caught many small good trout, that cut red; and in the other I caught a very few trout only, but as many of them were gillaroo or gizzard trout as common trout.

POIET.—This must have been an interesting kind of fishing. In what does the gillaroo differ from the trout?

HAL.—In appearance very little, except that they have more red spots, and a yellow or golden-coloured belly and fins, and are generally a broader and thicker fish; but internally they have a different organisation, possessing a large thick muscular stomach, which has been improperly compared to a fowl's, and which generally contains a quantity of small shell-fish of three or four kinds; and though in those I caught the stomachs were full of these shell-fish, yet they rose greedily at the fly.

POIET.—Are they not common trout which have gained the habit of feeding on shell-fish?

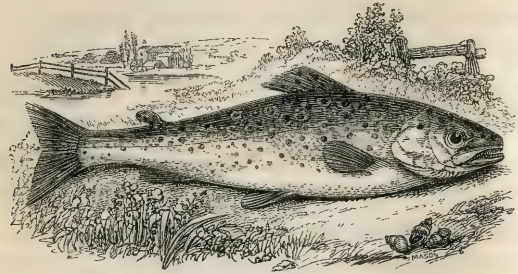
HAL.—If so, they have been altered in a succession of generations. The common trouts of this lake have stomachs like other trouts, which never, as far as my experience has gone, contain shell-fish; but of the gillaroo trout, I have caught with a fly some not longer than my finger, which have had as perfect a

hard stomach as the larger ones, with the coats as thick in proportion, and the same shells within; so that this animal is at least *now* a distinct species, and is a sort of link between the trout and charr, which has a stomach of the same kind with the gillaroo, but not quite so thick, and which feeds at the bottom in the same way. I have often looked in the lakes abroad for gillaroo trout, and never found one. In a small lake at the foot of the Crest of the Brenner, above 4000 feet above the level of the sea, I once caught some trout, which, from their thickness and red spots, I suspected were gillaroo, but on opening the stomach I found I was mistaken; it had no particular thickness, and was filled with grasshoppers: but there were *charr*, which fed on *shell-fish*, in the same lake.

POIET.—Are water-flies found on all rivers?

HAL.—This is a question which I find it impossible to answer; yet from my own experience I should suppose, that in all the habitable parts of the globe certain water-flies exist wherever there is running water. Even in the most ardent temperature, gnats and musquitoes are found, which lay their congeries of eggs on the water, which, when hatched, become first worms, afterwards small shrimp-like aureliæ, and lastly flies. There are a great number of the largest species of these flies on stagnant waters and lakes, which form a part of the food of various fishes,

POIET.—You spoke just now of the gillaroo trout as belonging only to Ireland. I can, however, hardly



Gillaroo—Loch Melvin.

bring myself to believe, that such a fish is not to be found elsewhere. For lakes with shell-fish and charr are common in various parts of Europe, and as the gillaroo trout is congenerous, it ought to exist both in Scotland and the Alpine countries.

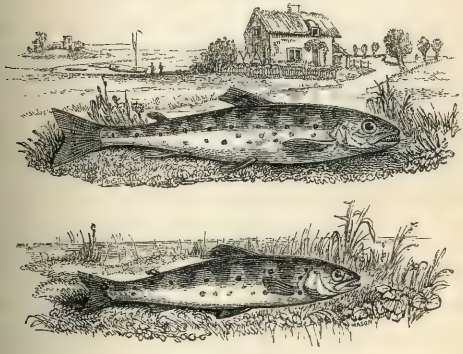
HAL.—It is not possible from analogies of this kind to draw certain inferences. Subterraneous cavities and subterranean waters are common in various countries, yet the Proteus Anguinus is only found in two places in Carniola—at Adelsburg and

draining, but not to deep thorough draining, the tendency of which is the reverse, similar to that of peat mosses, and perhaps even in a higher degree. The constant stream of water that flows from land thus drained, even in a period of drought, is proof of the influence adverted to.—**J. D.**]

Sittich. As I mentioned before, I have never yet met with a gillaroo trout, except in Ireland. It is true, it is only lately that I have had my attention directed to the subject, and other fishermen or naturalists may be more fortunate.

POIET.—Have you ever observed any other varieties of the trout kind, which may be considered as, like the gillaroo, forming a distinct species?

HAL.—I think the parr, samlet, or brandling, common to most of our rivers which communicate with the sea, has a claim to be considered a distinct



Parr, or Samlet.

species; yet the history of this fish is so obscure, and so little understood, that, perhaps, I ought not to venture to give an account of it. But in doing so, you will consider me as rather asking for new infor-

mation, than as attempting a satisfactory view of this little animal.

ORN.—I have seen this fish in the rivers of Wales and Herefordshire, and have heard it asserted, on what appeared to me good authority, that it was a mule,—the offspring of a trout and a salmon.

HAL.—This opinion, I know, has been supported by the fact, that it is found only in streams which are occasionally visited by salmon; yet I know no direct evidence in favour of the opinion, and I should think it much more probable, if it be a mixed race, that it is produced by the sea trout and common trout. In a small river, which runs into the Moy, near Ballina in Ireland, I once caught in October a great number of small sea trout, which were generally about half-a-pound in weight, and were all *males;* and unless it be supposed, that the females were in the river likewise, and would not take the fly, these fish, in which the spermatic system was fully developed, could only have impregnated the ova of the common river trout. The sea trout and river trout are, indeed, so like each other in character, that such a mixture seems exceedingly probable; but I know no reason why such mules should always continue small, except that it may be a mark of imperfection. The only difference between the parr and common small trout is in the colours, and its

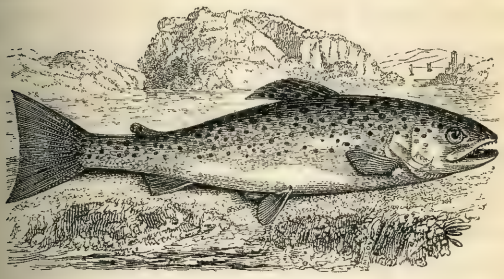
possessing one or two spines more in the pectoral fin. The parr has large blue or olive bluish marks on the sides, as if they had been made by the impression of the fingers of a hand; and hence the fish is called in some places *fingerling*. The river and sea trout seem capable of changing permanently their places of residence; and sea trout appear often to become river trout. In this case they lose their silvery colour, and gain more spots; and in their offspring these changes are more distinct. Fish, likewise, which are ill-fed remain small; and parrs are exceedingly numerous in those rivers where they are found, which are never separated from the sea by impassable falls; from which I think it possible that they are produced by a cross between sea and river trout.*

[* Since the researches of Mr. Shaw, published in 1837, naturalists, with few exceptions, have come to the conclusion that the parr is the young of the salmon, as is also the smelt, or smolt,—the one in its earlier stage, having characteristic transverse marks—those which have given rise to the designation of fingerling, perhaps of brandling,—the other, after those marks have disappeared, and the fish has acquired the uniformity of silvery colouring of the salmon, preparatory to its quitting its native stream for the sea. In relation to the fresh-water parr compared with the salt-water salmon, there are some circumstances which are remarkable, and which might well lead to the conclusion that the parr is distinct from the salmon. The parr, whilst in fresh water, grows slowly, the young salmon, as soon as it enters the sea, very rapidly, as has been proved by the observations of Mr. Young, but though growing slowly in fresh water, the parr feeds well and is in good condition,—using the varied food of the common trout—flies, worms, larvæ, fresh-water shell-fish, and squillæ—as if a distinct

The varieties of the common trout are almost infinite; from the great lake trout, which weighs above 60 or 70 lbs., to the trouts of the little mountain brook or small mountain lake, or tarn, which is scarcely larger than the finger. The smallest trout spawn nearly at the same time with the larger ones, and their ova are of the same size; but in the large trout there are tens of thousands, and in the small ones rarely as many as forty,—often from ten to forty. So that in the physical constitution of these animals, their production is diminished as their food is small in quantity; and it is remarkable that the ova of the large and beautiful species which exist in certain

species. And in accordance, both its roe and soft milt are found more or less developed, so that the sexes can be easily distinguished. In most instances the milt is more fully formed than the roe; but there are examples of the latter having been found of full size. Mr. Yarrell, in his "Hist. of British Fishes," quotes one on the authority of a trust-worthy observer, Dr. Heysham of Carlisle; and he has in his possession, preserved in spirits, a like specimen taken undoubtedly from a parr, which he had the kindness to show me. These circumstances and others lead to the inference that the young salmon, as a parr, is capable of breeding, and does occasionally breed in some of our rivers, so that the species can be continued; and that a descent to the sea and high feeding there are not absolutely essential to the preservation of the species. Of those parrs which I have examined, taken from streams in the lake districts, as many have been females as males: the proportion in which the marks of the sex were not distinguishable, was very small. For much valuable information on this interesting subject, see the article "Salmonidæ," in vol. ii., 1st and 2nd editions, of Mr. Yarrell's excellent work on "British Fishes," and Mr. Scrope's "Days and Nights of Salmon Fishing."—J. D.]

lakes, and which seem always to associate together, appear to produce offspring, which, in colour, form, and power of growth and reproduction, resemble



Great Lake Trout.

the parent fishes; and they generally choose the same river for their spawning. Thus, in the lake of Guarda, the Benacus of the ancients, the magnificent trout, or *Salmo fario*, which in colour and appearance is like a fresh run salmon, spawns in the river at Riva, beginning to run up for that purpose in June, and continuing to do so all the summer; and this river is fed by streams from snow and glaciers in the Tyrol, and is generally foul: whilst the small spotted common trouts, which are likewise found in this lake, go into the small brooks, which have their sources not far off, and in which, it is probable, they were originally bred. I have seen taken in the same net

small fish of both these varieties, which were as marked as possible in their characters,—one silvery, like a young salmon, blue on the back, and with small black spots only,—the other, with yellow belly and red spots, and an olive-coloured back. I have made similar observations in other lakes, particularly in that of the Traun near Gmünden, and likewise at Loch Neah in Ireland. Indeed, considering the sea trout as the type of the species *trout*, I think all the other true trouts may not improperly be considered as varieties, in which the differences of food and of habits have occasioned, in a long course of ages, differences of shape and colours, transmitted to offspring in the same manner as in the variety of dogs, which may all be referred to one primitive type.*

* I have known the number of spines in the pectoral fins different, in different varieties of trout; I have seen them 12, 13, and 14: but the anal fin always, I believe, contains 11 spines, the dorsal 12 or 13, the ventral 9, and the caudal 21. The smallest brook trout, when well and copiously fed, will increase in stews to four or five pounds in weight, but never attains the size or characters of lake trout.

Mr. Tonkin of Polgaron put some small river trout, 2½ inches in length, into a newly-made pond. He took some of these out the second year, and they were above 12 inches in length; the third year, he took one out that was 16 inches; and the fourth year, one of 25 inches: this was in 1734. (*Carew's Survey of Cornwall*, p. 87. Lord de Dunstanville's edition.)

[It is now generally admitted by those naturalists who are the highest authorities relative to the species of fish, that there are, ex-

PHYS.—I am somewhat amused at your idea of the change produced in the species of trout by the formation of particular characters by particular accidents, and their hereditary transmission. It reminds me of the ingenious but somewhat unsound views of Darwin on the same subject.

HAL.—I will not allow you to assimilate my views to those of an author, who, however ingenious, is far too speculative; whose poetry has always appeared to me weak philosophy, and his philosophy indifferent poetry: and to whom I have been often accustomed to apply Blumenbach's saying, that there were many things new and many things true in his doctrines; but that what was new was not true, and what was true was not new.

POIET.—I think Halieus is quite in the right to be a little angry at your observation, Physicus, in making him a disciple of a writer, who, as well as I can recollect, has deduced the *genesis* of the human being, by a succession of changes dependent upon

clusive of the salmon (*Salmo salar*), three distinct species of the trout: two migratory, the salmon trout, or salmon peal (*Salmo trutta*), and the sea trout, or bull trout (*Salmo eriox*); and one not migratory, the common trout (*Salmo fario*); each possessing certain distinctive structural marks, especially in the relative proportions of their maxillæ. Ample information is given on this subject in Mr. Yarrell's "History of British Fishes."—J. D.]

irritabilities, sensibilities, and appetencies, from the *fish;* blending the wild fancies of Buffon with the profound ideas of Hartley, and thus endeavouring to give currency to an absurd romance, by mixing with it some philosophical truths. I hope your parallel will induce him to do us the favour to state his own notions more at large.

HAL.—Physicus has mistaken me; and I will explain. What I mentioned of the varieties of dogs as sprung from one type, he will, I am sure, allow me to apply, with some modifications, to all our cultivated breeds of animals, whether horses, oxen, sheep, hogs, geese, ducks, turkeys, or pigeons; and he will allow, that certain characters gained by accidents, either from peculiar food, air, water, or domestic treatment, are transmitted to, and often strengthened in, the next generation;—the qualities being, as it were, doubled when belonging to both parents, and retained in spite of counteracting causes. It will be sufficient for me to mention only a few cases. The blood-horse of Arabia is become the favourite of the north of Europe, and the colts possess all the superior qualities of their parents, even in the polar circle. The offspring of the Merino sheep retain the fineness of their wool in England and Saxony. Poultry, bantams, tumbling and carrier pigeons, geese, ducks, turkeys, &c., all afford instances of the same kind;

and in the goose and duck, not only is the colour of the feathers changed, but the form of the muscles of the legs and wings,—those of the wings, being little employed, become weak and slender,—those of the legs, on the contrary, being much used, are strong and fleshy. And it is well to know this, as, in the young birds, the muscles of the legs and thighs are the best parts for the epicure, a large quantity of flesh being developed there, but not yet hardened or rendered tough by exercise. These facts are of the same kind and depend on the same principles, as the peculiarity of the breeds or races in trouts. Fish in a clear cool river, that feed much on larvæ, and that swallow their hard cases, become yellower, and the red spots increase so as to outnumber the black ones; and these qualities become fixed in the young fishes, and establish a particular variety. If trout from a lake, or another river of a different variety, were introduced into this river, they would not at once change their characters; but the change would take place gradually. Thus I have known trout from a lake in Scotland, remarkable for their deep red flesh, introduced into another lake, where the trout had only white flesh, and they retained the peculiar redness of their flesh for many years. At first they all associated together in spawning in the brook which fed the lake, but those newly introduced were

easily known from their darker backs and brighter sides. By degrees, however, from the influence of food and other causes, they became changed; the young trout of the introduced variety had flesh less red than their parents; and in about twenty years the variety was entirely lost, and all the fish were in their original white state. A very speculative reasoner might certainly defend the hypothesis, of the change of *species* in a long course of ages, from the establishment of particular characters as hereditary. It might be said, that trout, after having thickened their stomachs by feeding on larvæ with hard cases, gained the power of eating shell-fish, and were gradually changed to gillaroos and to charr,—their red spots and the yellow colour of their belly and fins increasing. In the same manner it might be said, that the large trout which feed almost entirely on small fishes, gained more spines in the pectoral fins and became a new species; but *I* shall not go so far, and I know no facts of this kind. The gillaroo and the charr appear always with the same characters; and I have never seen any fish that seemed in a state of transition from a trout to a gillaroo or a charr; which, I think, must have been the case if such changes took place. I hope, after this explanation, Physicus will not find any analogy between my ideas and those of a school, to which I am not

ambitious of being thought to belong; and that he will allow my views to be sound, or at least founded upon correct analogies.

POIET.—Do you know any facts of a similar kind in confirmation of your idea that the parr is a mule?

HAL.—I have heard of similar instances, but I cannot say I have myself witnessed them. The common carp and the cruscian are said to produce a mixed race, and likewise the rud and the roach; but I have never paid much attention to varieties of the carp kind. A friend of mine informed me, that in a branch of the Test, into which graylings had recently been introduced, his fisherman caught a fish which appeared to be from a cross between the trout and grayling, having the high back fin of the grayling, and the head and spots of the trout: this is the more remarkable, if correct, as the grayling spawns in the late spring, and the trout in the late autumn or winter: yet I *do* recollect that I once took a grayling in the end of November, in which the ova were so large, as nearly to be ready for protrusion. The fisherman of the Gründtl See, in Styria, informed me, that he had seen a fish which he believed to be a mule between the trout and charr, the fins of which resembled those of a trout, though the body was in other respects like that of a charr. The seasons at which these two species

spawn approach nearer to each other; but the charr spawns in still and the trout in running water. In general the trout are mature before the charr, yet I have seen in the Leopoldstein See, in Styria, a female charr, of which the eggs were almost fully developed as early as June: the fisherman of the Gründtl See said, that these peculiar fish were very rare, and that he caught only one in about 500 charr. It is not, I think, impossible, that it may be an umbla, a fish that might be expected to be found in that deep, cold, Alpine lake, a peculiar species and not a mixed variety. It is a fertile and very curious subject for new experiments, that of crossing the breeds of fishes, and offers a very interesting and untouched field of investigation, which I hope will soon be taken up by some enlightened country gentleman, who in this way might make not only curious but useful discoveries.

POIET.—So much science would be required to make these experiments with success, and there would be so many difficulties in the way of preserving fishes at the time they are proper for reproduction, that I fear very few country gentlemen would be capable of prosecuting the inquiry.

HAL.—The science required for this object is easily attained, and the difficulties are quite imaginary. The impregnation of the ova of fishes is performed out

of the body, and it is only necessary to pour the spermatic liquor from the milt upon the ova in water. Mr. Jacobi, a German gentleman, who made many years ago experiments on the increase of trout and salmon, informs us, that the ova and milt of mature fish, recently dead, will produce living offspring. His plan of raising trout from the egg was a very simple one. He had a box made with a small wire grating at one end in the cover, for admitting water from a fresh source or stream, and at the other end of the side of the box there were a number of holes to permit the exit of the water: the bottom of the box was filled with pebbles and gravel of different sizes, which were kept covered with water that was always in motion. In November or the beginning of December, when the trout were in full maturity for spawning, and collected in the rivers for this purpose upon beds of gravel, he caught males and females in a net, and by the pressure of his hands, received the ova in a basin of water, and suffered the milt to pass into the basin; and after they had remained a few minutes together, he introduced them upon the gravel in the box, which was placed under a source of fresh, cool, and pure water. In a few weeks the eggs burst, and the box was filled with an immense number of young trout, which had a small bag attached to the lower part of their body containing a part of the yolk

of the egg, which was still their nourishment. In this state they were easily carried from place to place in confined portions of fresh water for some days, requiring, apparently, no food; but, after about a week, the nourishment in their bag being exhausted, they began to seek their food in the water, and rapidly increased in size. As I have said before, Mr. Jacobi assures us, that the experiment succeeded as well with mature fish, that had been killed for the purpose of procuring the roe and milt, these having been mixed together in cold water immediately after they have been taken out of the body. I have had this experiment tried twice, and with perfect success, and it offers a very good mode of increasing to any extent the quantity of trout in rivers or lakes; for the young ones are preserved from the attacks of fishes, and other voracious animals or insects, at the time when they are most easily destroyed, and perfectly helpless. The same plan, I have no doubt, would answer equally well with grayling or other varieties of the salmo genus. But in all experiments of this kind, the great principle is, to have a constant current of fresh and aerated water running over the eggs. The uniform supply of air to the embryo in the egg is essential for its life and growth, and such eggs as are not supplied with water saturated with air are unproductive. The experimenter must be guided exactly

by the instinct of the parent fishes, who take care to deposit the impregnated eggs that are to produce their offspring, only in sources continually abounding in fresh and aerated water.*

PHYS.—But as every species of fish has a particular and usually different time for spawning, I do not see how it could be contrived to cross their breeds, or how the ova of a trout, which spawns in December, could be impregnated by the spermatic fluid of the grayling, which spawns in May; for I conclude it would be impossible to preserve the eggs of a fish out of the body in a state in which they could retain or recover their vitality.

HAL.—I believe I mentioned before, that I had found instances, in which the ova of fish were developed at a different period from their natural one; and I have no doubt, that a little inquiry respecting the habits of fishes would enable us to acquire a knowledge of the circumstances, which either hasten or retard their maturity. Plenty of food and a genial season hasten the period of their reproduction, which is delayed by

[* For success in such trials it may be well to imitate nature as closely as possible, and to have the breeding box made of stone with perforated stone partitions. I have heard of a failure on a large scale, made apparently under favourable circumstances and conducted with care, in which the boxes used were of wood and the partitions of perforated zinc. Leeches, it is well known, can be long preserved in stone tanks, and even breed in them, but not in tanks of wood.—J. D.]

want of proper nourishment, and by unfavourable weather. Males and females likewise, confined from each other, have their generative powers impeded; and trout, grayling, and salmon, will not deposit their ova except in running water; so that by keeping them in tanks, the period of their maturity might be considerably altered. I have seen charr even, which had been kept in confined water from September till July; and so slow had been the progress of the ova, that they appeared to be about this time fit for exclusion, though, in the natural course of things, they would have been ripe in the end of October of the year before. By attending to and controlling all these circumstances, I have no doubt many interesting experiments might be made, as to the possibility of modifying the varieties of the salmo, by impregnating the ova of one species with the spermatic fluid of another. With fishes of other genera the task would be still more easy. Carp, perch, and pike, deposit their ova in still water in spring and summer, when it is supplied with air by the growth of vegetables: and it is to the leaves of plants, which afford a continual supply of oxygen to the water, that the impregnated eggs usually adhere; so that researches of this kind might be conducted within doors in close vessels, filled with plants, exposed to the sun. I have myself kept minnows and sticklebacks alive for many months in

the same confined quantity of water, containing a few confervæ; and their ova and milt increased in the same manner, as if they had been in their natural situation.

ORN.—I conclude from your statements, Halieus, that nothing more is required for the production of fishes from impregnated eggs, than a constant supply of water of a certain temperature furnished with air; and of course the same principles will apply to fishes of the sea.

HAL.—There can be no doubt of it: and fishes in spawning time always approach great shallows, or shores covered with weeds, that, in the process of their growth, under the influence of the sunshine, constantly supply pure air to the water in contact with them.

POIET.—In every thing belonging to the economy of nature, I find new reasons for wondering at the designs of Providence,—at the infinite intelligence by which so many complicated effects are produced by the most simple causes. The precipitation of water from the atmosphere, its rapid motion in rivers, and its falls in cataracts, not only preserve this element pure, but give it its vitality, and render it subservient even to the embryo life of the fish; and the storms which agitate the ocean, and mingle it with the atmosphere, supply at once food to marine

plants, and afford a principle of life to the fishes which inhabit its depths. So that the perturbation and motion of the winds and waves possess a use, and ought to impress us with a beauty higher and more delightful even than that of the peaceful and glorious calm.

THIRD DAY.

HALIEUS—POIETES—ORNITHER—PHYSICUS.

SCENE—DENHAM.

Morning.

HAL.—You will soon take your leave, gentlemen, of this agreeable villa; but we must catch at least two brace of trout to carry with us to London, as a present for two worthy patrons of the angle. For though I know our liberal host will have a basket of fish packed up for each of our party, yet fish taken this morning will be imagined a more acceptable present than those caught yesterday. The May-fly is already upon the water, though not in great quantity, and it will consequently be more easy to catch the fish, which I see are rising with great activity. I advise you to go to the deep water below, where you will find the largest fish, and I will soon follow you.

POIET.—I hope I shall catch a large fish,—a

companion to that which Ornither took yesterday with a natural fly.

[*Halieus leaves them fishing, and returns to the house; but soon comes back and joins his companions, whom he finds fishing below in the river.*]

HAL.—Well, gentlemen, what sport?

POIET.—The fish are rising everywhere; but though we have been throwing over them with all our skill for a quarter of an hour, yet not a single one will take, and I am afraid we shall return to breakfast without our prey.

HAL.—I will try; but I shall go to the other side, where I see a very large fish rising. There! I have him at the very first throw. Land this fish, and put him into the well. Now I have another; and I have no doubt I could take half a dozen in this very place, where you have been so long fishing without success.

PHYS.—You must have a different fly; or have you some unguent or charm to tempt the fish?

HAL.—No such thing. If any of you will give me your rod and fly, I will answer for it, I shall have the same success. I take your rod, Physicus.—And lo! I have a fish!

PHYS.—What can be the reason of this? It is perfectly inexplicable to me. Yet Poietes seems to

throw as light as you do, and as well as he did yesterday.

HAL.—I am surprised, that you, who are a philosopher, cannot discover the reason of this. Think a little.

ALL.—We cannot.

HAL.—As you are my scholars, I believe I must teach you. The sun is bright, and you have been, naturally enough, fishing with your backs to the sun, which, not being very high, has thrown the shadows of your rods and yourselves upon the water; and you have alarmed the fish whenever you have thrown a fly. You see I have fished with my face towards the sun; and though inconvenienced by the light, have given no alarm. Follow my example and you will soon have sport, as there is a breeze playing on the water.

PHYS.—Your sagacity puts me in mind of an anecdote which I remember to have heard respecting the late eloquent statesman, Charles James Fox, who, walking up Bond Street from one of the club-houses with an illustrious personage, laid him a wager that he would see more cats than the Prince in his walk, and that he might take which side of the street he liked. When they go to the top, it was found that Mr. Fox had seen thirteen cats, and the Prince not one. The royal personage asked for an explanation

of this apparent miracle, and Mr. Fox said, "Your Royal Highness took, of course, the shady side of the way, as most agreeable; I knew that the sunny side would be left to me, and cats always prefer the sunshine."

HAL.—There! Poietes, by following my advice you have immediately hooked a fish; and while you are catching a brace, I will tell you an anecdote which as much relates to fly-fishing as that of Physicus; and affords an elucidation of a particular effect of light.

A manufacturer of carmine, who was aware of the superiority of French colour, went to Lyons for the purpose of improving his process, and bargained with the most celebrated manufacturer in that capital for the acquisition of his secret; for which he was to pay a thousand pounds. He was shown all the processes and saw a beautiful colour produced, yet he found not the least difference in the French mode of fabrication and that which he had constantly adopted. He appealed to the manufacturer, and insisted that he must have concealed something. The manufacturer assured him that he had not, and invited him to see the process a second time. He minutely examined the water and the materials, which were the same as his own; and, very much surprised, said, "I have lost my labour and my money, for the air of England

does not permit us to make good carmine." "Stay," says the Frenchman, "do not deceive yourself: what kind of weather is it now?" "A bright sunny day," said the Englishman. "And such are the days," said the Frenchman, "on which I make my colour. Were I to attempt to manufacture it on a dark or cloudy day, my result would be the same as yours. Let me advise you, my friend, always to make carmine on bright and sunny days." "I will," says the Englishman; "but I fear I shall make very little in London."

POIET.—Your anecdote is as much to the purpose as that of Physicus; yet I am much obliged to you for the hint respecting the effect of shadow, for I have several times in May and June had to complain of too clear a sky, and wished, with Cotton, for

> A day with not too bright a beam;
> A warm, but not a scorching, sun.

HAL.—Whilst we have been conversing, the May-flies, which were in such quantities, have become much fewer; and I believe the reason is, that they have been greatly diminished by the flocks of swallows, which everywhere pursue them: I have seen a single swallow take four, in less than a quarter of a minute, that were descending to the water.

POIET.—I delight in this living landscape! The

swallow is one of my favourite birds, and a rival of the nightingale: for he cheers my sense of hearing; he is the glad prophet of the year—the harbinger of the best season; he lives a life of enjoyment amongst the loveliest forms of nature; winter is unknown to him; and he leaves the green meadows of England in autumn, for the myrtle and orange groves of Italy, and for the palms of Africa :—he has always objects of pursuit, and his success is secure. Even the beings selected for his prey are poetical, beautiful, and transient; the ephemeræ are saved by his means from a slow and lingering death in the evening, and killed in a moment, when they have known nothing of life but pleasure. He is the constant destroyer of insects,—the friend of man; and, with the stork and the ibis, may be regarded as a sacred bird. His instinct, which gives him his appointed seasons, and teaches him always when and where to move, may be regarded as flowing from a Divine Source; and he belongs to the Oracles of Nature, which speak the awful and intelligible language of a present Deity.

Sea Trout—Salmo Trutta Marina.

Salmon—Salmo Salar.

FOURTH DAY.

HALIEUS—POIETES—ORNITHER—PHYSICUS.

FISHING FOR SALMON AND SEA TROUT.

Scene—Loch Maree, West of Rosshire, Scotland.
Time—Middle of July.

POIET.—I begin to be tired. This is really a long day's journey; and these last ten miles through bogs, with no other view than that of mountains half

hid in mists, and brown waters that can hardly be called lakes, and with no other trees than a few stunted birches, that look so little alive, that they might be supposed immediately descended from the bogwood, every where scattered beneath our feet, have rendered it extremely tedious. This is the most barren part of one of the most desolate countries I have ever passed through in Europe; and though the inn at Strathgarve is tolerable, that of Auchnasheen is certainly the worst I have ever seen,—and I hope the worst I shall ever see. We ought to have good amusement at Pool Ewe, to compensate us for this uncomfortable day's journey.

HAL.—I trust we shall have sport, as far as salmon and sea trout can furnish sport. But the difficulties of our journey are almost over. See, Loch Maree is stretched at our feet, and a good boat with four oars will carry us in four or five hours to our fishing ground; a time that will not be mispent, for this lake is not devoid of beautiful, and even grand scenery.

POIET.—The scenery begins to improve; and that cloud-breasted mountain on the left is of the best character of Scotch mountains; these woods, likewise, are respectable for this northern country. I think I see islands also in the distance; and the quantity of cloud always gives effect to this kind of

view,—perhaps, without such assistance to the imagination, there would be nothing even approaching to the sublime in these countries; but cloud and mist, by creating obscurity and offering a substitute for greatness and distance, give something of an Alpine and majestic character to this region.

ORN.—As we are now fixed in our places in the boat, you will surely put out a rod or two with a set of flies, or try the tail of the par for a large trout or salmon: our fishing will not hinder our progress.

HAL.—In most other lakes I should do so; here I have often tried the experiment, but never with success. This lake is extremely deep, and there are very few fish which haunt it generally except charr; and salmon seldom rest but in particular parts along the shore, which we shall not touch. Our voyage will be a picturesque, rather than an angling one. I see we shall have little occasion for the oars, for a strong breeze is rising, and blowing directly down the lake; we shall be in it in a minute. Hoist the sails! On we go!—we shall make our voyage in half the number of hours I had calculated upon; and I hope to catch a salmon in time for dinner.

POIET.—The scenery improves as we advance nearer the lower parts of the lake. The mountains become higher, and that small island or peninsula presents a bold, craggy outline; and the birch wood

below it, and the pines above, form a scene somewhat Alpine in character. But what is that large bird soaring above the pointed rock, towards the end of the lake? Surely it is an eagle!

HAL.—You are right, it is an eagle, and of a rare and peculiar species—the gray or silver eagle, a noble bird! From the size of the animal, it must be the female; and her aery is in that high rock. I dare say the male is not far off.

PHYS.—I think I see another bird, of a smaller size, perched on the rock below, which is similar in form.

HAL.—You do: it is the consort of that beautiful and powerful bird; and I have no doubt their young ones are near at hand.

POIET.—Look at the bird! How she dashes into the water, falling like a rock, and raising a column of spray: she has dropt from a great height. And now she rises again into the air: what an extraordinary sight!

HAL.—She is pursuing her prey, and is one of our fraternity,—a catcher of fish. She has missed her quarry this time, and has soared further down towards the river, to fall again from a great height. There! You see her rise with a fish in her talons.

POIET.—She gives an interest to this scene, which

I hardly expected to have found. Pray are there many of these animals in this country?

HAL.—Of this species, I have seen but these two, and I believe the young ones migrate as soon as they can provide for themselves; for this solitary bird requires a large space to move and feed in, and does not allow its offspring to partake its reign, or to live near it. Of other species of the eagle, there are some in different parts of the mountains, particularly of the Osprey, and of the great fishing or brown eagle. I once saw a very fine and interesting sight above one of the Crags of Ben Weevis, near Strathgarve, as I was going, on the 20th of August, in pursuit of black game. Two parent eagles were teaching their offspring,—two young birds, the manœuvres of flight. They began by rising from the top of a mountain in the eye of the sun;—it was about midday, and bright for this climate. They at first made small circles, and the young birds imitated them; they paused on their wings, waiting till they had made their first flight, and then took a second and larger gyration,—always rising towards the sun, and enlarging their circle of flight so as to make a gradually extending spiral. The young ones still slowly followed, apparently flying better as they mounted; and they continued this sublime kind of exercise, always rising, till they became mere points

in the air, and the young ones were lost, and afterwards their parents, to our aching sight.* But we have touched the shore, and the lake has terminated; you are now on the river Ewe.

POIET.—Are we to fish here? It is a broad clear stream, but I see no fish, and cannot think it a good angling river.

* [This incident, so poetical, the Author first described in verse, with aspirations that can hardly fail to interest the general reader—J.D.]

THE EAGLES.

"The mighty birds still upwards rose,
In slow, but constant, and most steady flight,
The young ones following; and they would pause
As if to teach them how to bear the light,
And keep the solar glory full in sight!
So went they on, till, from excess of pain,
I could no longer bear the scorching rays;
And, when I looked again, they were not seen,
Lost in the brightness of the solar blaze.
Their memory left a type, and a desire:
So should I wish towards the light to rise,
Instructing younger spirits to aspire
Where I could never reach amidst the skies,
And joy below to see them lifted higher,
Seeking the light of purest glory's prize;
So would I look on splendour's brightest day,
With an undazzled eye, and steadily
Soar upwards full in the immortal ray,
Through the blue depths of the unbounded sky,
Pourtraying wisdom's boundless purity.
Before me still a lingering ray appears,
But broken and prismatic, seen thro' tears,
The light of joy and immortality."

HAL.—We are nearly a mile above our fishing station, and we must first see our quarters and provide for our lodging, before we begin our fishing: to the inn we have only a short walk.

POIET.—Why this inn is a second edition of Auchnasheen.

HAL.—The interior is better than the exterior, thanks to the Laird of Brahan. We shall find one tolerable room and bed, and we must put up our cots and provide our food. What is our store, Mr. Purveyor?

PHYS.—I know we have good bread, tea, and sugar. Then there is the quarter of roebuck, presented to us at Gordon Castle; and Ornither has furnished us with a brace of wild ducks, three leash of snipes, and a brace of golden plovers, by his mountain expedition of yesterday; and for fish we depend on you. Yet our host says there are fresh herrings to be had, and small cod-fish, and salmon, and trout in any quantity; and the claret and the Ferintosh are safe.

HAL.—Why we shall fare sumptuously. As it is not time yet for shooting grouse, we must divide our spoil for the few days we shall stay here. Yet there are young snipes and plovers on the mountains above, and I have no doubt we might obtain the Laird's permission to kill a roebuck in the woods, or a hart

on the mountains; but this is always an uncertain event, and I advise you, Ornither, to become a fisherman.

ORN.—I shall wait till I see the results of your skill. At all events, in this country I can never want amusement; and, I dare say, there are plenty of seals at the mouth of the river, and killing them is more useful to other fishermen than catching fish.

HAL.—Let there be a kettle of water, with salt, ready boiling in an hour, mine host, for the fish we catch or buy; and see that the potatoes are well dressed—the servants will look to the rest of our fare. Now for our rods.

POIET.—This is a fine river; clear, full, but not too large; with the two handed rod it may be commanded in most parts.

HAL.—It is larger than usual. The strong wind which brought us so quickly down has made it fuller; and it is not in such good order for fishing as it was before the wind rose.

POIET.—I thought the river was all the better for a flood, when clear.

HAL.—Better after a flood from rain; for this brings the fish up, who know when rain is coming, and likewise brings down food and makes the fish feed. But when the water is raised by a strong wind, the fish never run, as they are sure to find no increase

in the spring heads, which are their objects in running.

POIET.—You give the fish credit for great sagacity.

HAL.—Call it instinct rather; for if they *reasoned*, they would run with every large water, whether from wind or rain. What the feeling or power is, which makes them travel with rain, I will not pretend to define. But now for our sport.

POIET.—The fish are beginning to rise; I have seen two here already, and there is a third, and a fourth; scarcely a quarter of a minute elapses without a fish rising in some part of the pool.

HAL.—As the day is dark, I shall use a bright and rather a large fly, with jay's hackle, kingfisher's feather under the wing, and golden pheasant's tail, and wing of mixed grouse, and argus pheasant's tail. I shall throw over these fish; I ought to raise one.

POIET.—Either you are not skilful, or the fish know their danger. They will not rise.

HAL.—I will try another and a smaller fly.

POIET.—You do nothing.

HAL.—I have changed my fly a third time, yet no fish rises. I cannot understand this. The water is not in good order, or I should certainly have raised a fish or two. Now I will wager ten to one, that this pool has been fished before to-day.

ORN.—By whom?

HAL.—I know not; but take my wager and we will ascertain.

ORN.—I shall ascertain without the wager if possible. See, a man connected with the fishery advances, let us ask him. There you see; it has been fished once or twice by one, who claims without charter the right of angling.

HAL.—I told you so. Now I know this, I shall put on another kind of fly, such as I am sure they have not seen this day.

POIET.—It is very small and very gaudy, I believe made with humming bird's feathers.

HAL.—No,—the brightest Java dove's hackle, kingfisher's blue, and golden pheasant's feathers, and the red feathers of the paroquet. There was a fish that rose and missed the fly—a sea trout. There, he has taken it, a fresh run fish, from his white belly and blue back.

POIET.—How he springs out of the water! He must be 6 or 7 lbs.

HAL.—Under five, I am sure; he will soon be tired. He fights with less spirit: put the net under him. There, he is a fine fed sea trout, between 4 and 5 lbs. But our intrusive brother angler (as I must call him) is coming down the river to take his evening cast. A stout Highlander, with a powerful tail,—or, as we should call it in England, *suite*. He is resolved

not to be driven off, and I am not sure that the Laird himself could divert him from his purpose, except by a stronger tail, and force of arms; but I will try my eloquence upon him. "Sir, we hope you will excuse us for fishing in this pool, where it seems you were going to take your cast; but the Laird has desired us to stand in his shoes for a few days, and has given up angling while we are here; and as we come nearly a thousand miles for this amusement, we are sure you are too much of a gentleman to spoil our sport; and we will take care to supply your fish kettle while we are here, morning and evening, and we shall send you, as we hope, a salmon before night."

POIET.—He grumbles good sport to us, and is off with his tail: you have hit him in the right place. He is a pot fisher, I am sure, and somewhat hungry, and, provided he gets the salmon, does not care who catches it!

HAL.—You are severe on the Highland gentleman, and I think extremely unjust. Nothing could be more ready than his assent, and a keen fisherman must not be expected to be in the best possible humour, when he finds sport which he believes he has a right to, and which perhaps he generally enjoys without interruption, taken away from him by entire strangers. There is, I know, a disputed point about fishing with the rod, between him and the Laird;

and it would have been too much to have anticipated a courteous greeting from one, who considers us as the representatives of an enemy. But I see there is a large fish which has just risen at the tail of the pool. I think he is fresh run from the sea, for the tide is coming in. My fly and tackle are almost too fine for so large a fish, and I will put on my first fly with a very strong single gut link and a stretcher of triple gut. He has taken my fly, and I hold him—a powerful fish: he must be between 10 and 15lbs. He fights well, and tries to get up the rapid at the top of the pool. I must try my strength with him, to keep him off that rock, or he will break me. I have turned him, and he is now in a good part of the pool: such a fish cannot be tired in a minute or two, but requires from ten to twenty—depending upon his activity and strength, and the rapidity of the stream he moves against. He is now playing against the strongest rapid in the river, and will soon give in, should he keep his present place.

POIET.—You have tired him.

HAL.—He seems fairly tired: I shall bring him in to shore. Now gaff him; strike as near the tail as you can. He is safe; we must prepare him for the pot. Give him a stunning blow on the head to deprive him of sensation, and then make a transverse cut just below the gills, and crimp him, by cutting to

the bone on each side, so as almost to divide him into slices: and now hold him by the tail that he may bleed. There is a small spring, I see, close under that bank, which I dare say has the mean temperature of the atmosphere in this climate, and is much under 50°—place him there, and let him remain for ten minutes; then carry him to the pot, and before you put in a slice let the water and salt boil furiously, and give time to the water to recover its heat before you throw in another; and so proceed with the whole fish: leave the head out, and throw in the thickest pieces first.

PHYS.—Why did you not crimp your trout?

HAL.—We will have him fried. Our poacher prevented me from attending to the preparation; but for frying he is better not crimped, as he is not large enough to give good transverse slices.

POIET.—This salmon is a good fish, and fresh as you said from the sea. You see the salt-water louse adheres to his sides, and he is bright and silvery, and a thick fish; I dare say his weight is not less than 14lbs., and I know of no better fish for the table than one of that size.

PHYS.—It appears to me that so powerful a fish ought to have struggled much longer: yet, without great exertions on your part, in ten minutes he appeared quite exhausted, and lay on his side as if

dying: this induces me to suppose, that there must be some truth in the vulgar opinion of anglers, that fish are, as it were, drowned by the play of the rod and reel.

HAL.—The vulgar opinion of anglers on this subject I believe to be perfectly correct; though, to apply the word drowning to an animal that lives in the water is not quite a fit use of language. Fish, as you ought to know, respire by passing water, which always holds common air in solution, through their gills or branchial membrane, by the use of a system of muscles surrounding the fauces, which occasion constant contractions and expansions, or openings and closings of this membrane, and the life of the fish is dependent on the process in the same manner as that of a quadruped is on inspiring and expiring air. When a fish is hooked in the upper part of the mouth by the strength of the rod applied as a lever to the line, it is scarcely possible for him to open the gills as long as this force is exerted, particularly when he is moving in a rapid stream; and when he is hooked in the lower jaw, his mouth is kept closed by the same application of the strength of the rod, so that no aerated water can be inspired. Under these circumstances he is quickly deprived of his vital forces, particularly when he exhausts his strength by moving in a rapid stream.

A fish, hooked in a part of the mouth where the force of the rod will render his efforts to respire unavailing, is much in the same state as that of a deer caught round the neck by the lasso of a South American peon, who gallops forwards, dragging his victim after him, which is killed by strangulation in a very short time. When fishes are hooked foul, that is, on the outside of the body, as in the fins or tail, they will often fight for many hours, and in such cases very large salmon are seldom caught, as they retain their powers of breathing unimpaired; and if they do not exhaust themselves by violent muscular efforts, they may bid defiance to the temper and the skill of the fisherman. A large salmon, hooked in the upper part of the mouth in the cartilage or bone will sometimes likewise fight for a long while, particularly if he keep in the deep and still parts of the river, for he is able to prevent the force of the hook, applied by the rod, from interfering with his respiration, and by a powerful effort, can maintain his place, and continue to breathe in spite of the exertions of the angler. A fish, in such case, is said to be sulky, and his instinct, or his sagacity, generally enables him to conquer his enemy. It is, however, rarely that fishes hooked in the mouth are capable of using freely the muscles subservient to respiration; and their powers are generally, sooner or later, destroyed by suffocation.

POIET.—The explanation that you have just been giving us of the effects of playing fish, I confess alarms me, and makes me more afraid than I was before, that we are pursuing a very cruel amusement; for death by strangulation, I conceive, must be very laborious, slow, and painful.

PHYS.—I think as I did before I was an angler, as to the merciless character of field-sports; but I doubt if this part of the process of the fly-fisher ought so strongly to alarm your feelings. As far as analogies from warm-blooded animals can apply to the case, the death that follows obstructed respiration is quick, and preceded by insensibility. There are many instances of persons who have recovered from the apparent death produced by drowning, and had no recollection of any violent or intense agony; indeed, the alarm or passion of fear generally absorbs all the sensibility, and the physical suffering is lost in the mental agitation. I can answer from my own experience, that there is no pain which precedes the insensibility occasioned by breathing gases unfitted for supporting life, but oftener a pleasurable feeling, as in the case of the respiration of nitrous oxide. And in the suffocation produced by the gradual abstraction of air in a close room where charcoal is burning, we have the record of the son of a celebrated chemist, that the sensation which precedes the deep

sleep that ends in death is agreeable. There is far more pain in recovering from the insensibility produced by the abstraction of air than in undergoing it, as I can answer from my own feelings; and it is, I believe, quite true, what has been asserted, that the pain of being born, which is acquiring the power of respiration, is greater than that of dying, which is losing the power.

ORN.—I have heard, that persons who have been recovered from the insensibility produced by hanging, have never any recollection of the sufferings which preceded it; and as the blood is immediately determined to the head in this operation, probably apoplectic insensibility is almost instantaneous.

HAL.—The laws of nature are all directed by Divine Wisdom for the purpose of preserving life and increasing happiness. Pain seems in all cases to precede the mutilation or destruction of those organs which are essential to vitality, and for *the end* of preserving them; but the mere process of dying seems to be the falling into a deep slumber; and in animals, who have no fear of death dependent upon imagination, it can hardly be accompanied by very intense suffering. In the human being moral and intellectual motives constantly operate in enhancing the fear of death, which, without these motives in a reasoning being, would probably become null, and the

love of life be lost upon every slight occasion of pain or disgust; but imagination is creative with respect to both these passions, which, if they exist in animals, exist independent of reason, or as instincts. Pain seems intended by an all-wise Providence to prevent the *dissolution* of organs, and cannot follow their *destruction*. I know several instances in which the process of death has been observed, even to its termination, by good philosophers; and the instances are worth repeating: Dr. Cullen, when dying, is said to have faintly articulated to one of his intimates, "I wish I had the power of writing, or speaking, for then I would describe to you how pleasant a thing it is to die:" Dr. Black, worn out by age and a disposition to pulmonary hemorrhage, which obliged him to live very low, whilst eating his customary meal of bread and milk, fell asleep, and died in so tranquil a manner, that he did not even spill the contents of the basin which rested on his knee; and the late Sir Charles Blagden, whilst at a social meal with his friends, Mons. and Mad. Berthollet, and Gay-Lussac, died in his chair so quietly, that not a drop of the coffee in the cup, which he held in his hand, was spilt.

POIET.—Give us no more such instances, for I do not think it wise to diminish the love of life, or to destroy the fear of death.

HAL.—There is no danger of this. These passions

are founded on immutable laws of our nature, which philosophy cannot change; and it would be good if we could give the same security of duration to the love of virtue and the fear of vice or shame, which are connected with immutable interests, and which ought to occupy far more the consideration of beings destined for immortality. But to our business.

Now we have fish for dinner, my task is finished: Physicus and Poietes, try your skill. I have not fished over the best parts of this pool: you may catch a brace of fish here before dinner is ready.

PHYS.—It is too late, and I shall go and see that all is right.

POIET.—I will take one or two casts; but give me your fly; I like always to be sure that the tackle is taking.

HAL.—Try at first the very top of the pool, though I fear you will get nothing there; but here is a cast which I think the Highlander can hardly have commanded from the other side, and which is rarely without a good fish. There, he rose; a large trout of 10 lbs., or a salmon. Now wait a few minutes. When a fish has missed the fly, he will not rise again till after a pause—particularly if he has been for some time in the fresh water. Now try him again. He has risen, but he is a dark fish that has been some time in the water, and he tries to

drown the fly with a blow of his tail. I fear you will not hook him except foul, when most likely he would break you. Try the bottom of the pool, below where I caught my fish.

POIET.—I have tried all the casts and nothing rises.

HAL.—Come, we will change the fly for that which I used.

POIET.—Now I have one; he has taken the fly under water, and I cannot see him.

HAL.—Straighten your line, and we shall soon see him. He is a sea trout, but not a large one.

POIET.—But he fights like a salmon, and must be near 5 lbs.

HAL.—Under 3 lbs.; but these fish are always strong and active, and sometimes give more sport than larger fish. Shorten your line, or he will carry you over the stones and cut the link gut. He is there already; you have allowed him to carry out too much line: wind up as quick as you can, and keep a tight hand upon him. He is now back to a good place, and in a few minutes more will be spent. I have the net. There, he is a sea trout of nearly 3 lbs. This will be a good addition to our dinner; I will crimp him, that you may compare boiled sea trout with broiled, and with salmon. Now, if you please, we will cool this fish at the spring, and then go to our inn.

POIET.—If you like. I am endeavouring to find a reason for the effect of crimping and cold in preserving the curd of fish. Have you ever thought on this subject?

HAL.—Yes; I conclude that the fat of salmon between the flakes of the muscles is mixed with much albumen and gelatine, and is extremely liable to decompose, and by keeping it cool, the decomposition is retarded; and by the boiling salt and water, which is of a higher temperature than that of common boiling water, the albumen is coagulated, and the curdiness preserved. The crimping, by preventing the irritability of the fibre from being gradually exhausted, seems to preserve it so hard and crisp, that it breaks under the teeth; and a fresh fish not crimped is generally tough. A friend of mine, an excellent angler, has made some experiments on the fat of fish; and he considers the red colour of trout, salmon, and charr, as owing to a peculiar coloured oil, which may be extracted by alcohol; and this accounts for the want of it in fish that have fed ill, and after spawning. In general the depth of the red colour and the quantity of curd are proportional.

POIET.—Would not the fish be still better, or at least possess more curd, if caught in a net and killed immediately? In the operation of tiring by the reel there must be considerable muscular

exertion, and I should suppose expenditure of oily matter.

HAL.—There can be no doubt but the fish would be in a more perfect state for the table from the nets; yet a fish in high season does not lose so much fat during the short time he is on the hook, as to make much difference; and I am not sure, that the action of crimping after does not give a better sort of crispness to the fibre. This, however, may be fancy; we will discuss the matter again at table. See! our companion on the lake, the eagle, is coming down the river, and has pounced upon a fish in the pool near the sea.

PHYS.—I fear he will interfere with our sport: let us request Ornither to shoot him. I wish to see him nearer, and to preserve him as a specimen for the Zoological Society.

HAL.—O! no. He will not spoil our sport; and I think it would be a pity to deprive this spot of one of its poetical ornaments. Besides, the pool where he is now fishing contains scarcely any thing but trout; it is too shallow for salmon, who run into the cruives.

POIET.—I am of your opinion, and shall use my eloquence to prevent Ornither from attempting the life of so beautiful a bird; so majestic in its form, so well suited to the scenery, and so picturesque in all its habits.

THE INNKEEPER.—Gentlemen, dinner is ready:—

THE DINNER.

HAL.—Now take your places. What think you of our fish?

PHYS.—I never ate better; but I want the Harvey or Reading sauce.

HAL.—Pray let me entreat you to use no other sauce than the water in which he was boiled. I assure you this is the true Epicurean way of eating fresh salmon: and for the trout, use only a little vinegar and mustard,—a sauce *à la Tartare*, without the onions.

POIET.—Well, nothing can be better; and I do not think fresh net-caught fish can be superior to these.

HAL.—And these snipes are excellent. Either my journey has given me an appetite, or I think they are the best I ever tasted.

ORN.—They are good, but I have tasted better.

HAL.—Where?

ORN.—On the continent; where the common snipe, that rests during its migration from the north to the south in the marshes of Italy and Carniola, and the double or solitary snipe, becomes so fat, as to resemble that bird, which was formerly fattened

in Lincolnshire, the ruff; and they have, I think, a better flavour from being fed on their natural food.

HAL.—At what time have you eaten them?

ORN.—I have eaten them both in spring and autumn; but the autumnal birds are the best, and are like the ortolan of Italy.

HAL.—Where does the double snipe winter?

ORN.—I believe in Africa and Asia Minor. They are rarely seen in England, except driven by an east wind in the spring, or by a strong north wind in the autumn. Their natural progress is to and from Finland and Siberia, through the continent of Europe, to and from the east and south.* In autumn they pass more east, both because they are aided by west

* From the food, and the remains of food found in the stomach of the double snipe, I think I have ascertained, that it requires a kind of worm which is not found in winter even in the temperate climes of Europe; and that it feeds differently from the snipe. There are certainly none found after the end of October in either Illyria or Italy; and I believe the same may be said of the end of May, as to their summer migration, or their breeding migration. I have opened the stomachs of at least a dozen of these birds, and their contents were always of the same kind; long slender white hexapode larvæ, or their skins, of different sizes, from that of the maggot of the horse-fly to one thrice as long. I believe all these insects were the larvæ of tibulæ of different species. In the stomach of the common snipe, which is stronger and larger, I have generally found earth-worms, and often seeds, and rice, and gravel. I conjecture, that, in the temperate climates of Europe, most of the aquatic larvæ on which the solitary snipe feeds are converted into flies in the late spring and autumn, which probably limits the period of their migration. In 1827 the solitary snipe passed through

winds, and because the marshes in the east of Europe are wetter in that season: and in spring they return,

Italy and Illyria between the 15th of March and the 6th of May. I heard of the first at Ravenna the 17th of March, and I shot two near Laybach on the 5th of May; but though I was continually searching for them a fortnight after, I found no more. This year they returned from the north early; and I saw some in the marshes of Illyria on the 19th of August. In 1828 they were later in their vernal passage, and likewise in their return. I found them in Illyria through May, as late as the 17th, on which day I shot three, and they did not reappear till the beginning of September. I found one on the 3rd, and three on the 4th, and twenty were shot on the 7th.

As this bird is rarely seen in England, I shall mention its peculiarities. It is more than one-third larger than the common snipe, and has a breast spotted with gray feathers. Its beak is shorter than that of the snipe; the old ones have feathers almost pure white in their tails, and as they spread them when rising, they are easily distinguished by this character from the snipe; but in the young birds that I have seen in August, this character was wanting. They are usually very fat, particularly the young birds; their weight varies from six to nine ounces; but even the fattest ones are rarely above seven ounces and a half; and though I have killed more than a hundred, I can speak of half-a-dozen only that weighed above eight ounces and a half. In spring they are usually found in pairs, the female being rather larger, and having a paler breast; in autumn they are solitary. They prefer wet meadows to bogs, or large, deep marshes. They usually lie closer than snipes, and seldom fly far; their flight is straight, like that of a jack snipe, and they are easily shot.

Attention to the migrations of birds might, I have no doubt, lead to important indications respecting the character and changes of the weather and the seasons. The late migration of the solitary snipe this year (1828) seems to have been an indication of a wet and backward summer in the north of Europe. But to form opinions upon facts of this kind requires much knowledge and caution. The perfection of the larvæ of the tibulæ on which this snipe feeds, depends upon a number of

but the larger proportion through Italy, where they are carried by the *Sirocco*, and which at that time is *extremely wet*. Come, let us have another bottle of claret: a pint per man is not too much after such a day's fatigue.

HAL.—You have made me president for these four days, and I forbid it. A half pint of wine for young men in perfect health is enough, and you will be able to take your exercise better, and feel better for this abstinence. How few people calculate upon the effects of constantly renewed fever in our luxurious system of living in England! The heart is made to act too powerfully, the blood is thrown upon the nobler parts, and, with the system of wading adopted by some sportsmen, whether in shooting or fishing, is delivered either to the hemorrhoidal veins, or, what is worse, to the head. I have known several free livers, who have terminated their lives by apoplexy, or have been rendered miserable by palsy, in consequence of the joint effects of cold feet and too stimulating a diet; that is to say, as much animal food as they could eat, with a pint or perhaps a bottle of wine per day. Be guided by me, my friends, and neither drink nor wade.

circumstances—the temperature of the last year, the period when the eggs were laid, the heat of the water when they were deposited, and the quantity of rain since. The migration of the solitary snipe is only one link in a great chain of causes and effects, all connected, and extending from Africa to Siberia.

I know there are old men who have done both, and have enjoyed perfect health; but these are *devil's decoys* to the unwary, and ten suffer for one that escapes. I could quote to you an instance from this very county, in one of the strongest men I have ever known. He was not intemperate, but he lived luxuriously, and waded as a salmon fisher for many years in this very river; but before he was fifty, palsy deprived him of the use of his limbs, and he is still a living example of the danger of the system which you are ambitious of adopting.

ORN.—Well, I give up the wine, but I intend to wade in Hancock's boots to-morrow.

HAL.—Wear them, but do not wade in them. The feet become cold in a stream of water constantly passing over the caoutchouc and leather, notwithstanding the thick stockings. They are good for keeping the feet warm, and I think where there is exercise, as in snipe shooting, they may be used without any bad effects. But I advise no one to stand still (which an angler must do sometimes) in the water, even with these ingenious water-proof inventions. All anglers should remember old Boerhaave's maxim of health, and act upon it: "Keep the feet warm, the head cool, and the body open." *

PHYS.—I am sorry we did not examine more

* [The above cautions, as regards "drinking," and high living, are

minutely the weight and size of the fish we caught, and compare the anatomy of the salmon and the sea trout; but we were in too great a hurry to see them on the table, and our philosophy yielded to our hunger.

HAL.—We shall have plenty of opportunities for this examination; and we can now walk down to the fishing-house and see probably half a hundred fish of different sizes, that have been taken in the cruives, this evening, and examine them at our leisure.

ALL.—Let us go!

PHYS.—I never saw so many fish of this kind before; and I conclude that heap of smaller fish is composed of trout.

HAL.—Certainly. Let us compare one of the

warranted by the amplest experience; but, in relation to wading, they may be considered as severe, and of questionable propriety. In moderation, especially in autumn, when our rivers are comparatively warm, I am disposed to think that wading may be practised with little if any risk by those of sound constitution, and with some benefit even, using shoes or boots so perforated as not to confine the water, and wearing worsted stockings. Such a foot bath as is thus obtained is an excellent remedy for corns, superior to any other I am acquainted with; it also diminishes fatigue and makes the exercise more agreeable, as well as ensures better sport. With all deference to the received maxim of Boerhaave—just, in just degree,—it is well to remember, that the human feet are unprotected by hair, as if it were the intention of nature that they should be cool. Water-proof boots, unless when wading, are, to the majority of anglers, intolerable, being so heating and wearying.—**J. D.**]

largest trout with a salmon. I have selected two fresh run fish,* which, from their curved lower jaws, are, I conclude, both males. The salmon you see is broader, has a tail rather more forked, and the teeth in proportion are rather smaller. The trout, likewise, has larger and more black brown spots on the body; and the head of the trout is a little larger in proportion. The salmon has 14 spines in the pectoral fins, 10 in each of the ventral, 13 in the anal, 21 in the caudal, and 15 in the dorsal. The salmon measures 38½ inches in length, and 21 inches in girth, and his weight, as you see, is 22¼lbs. The trout has one spine less in the pectoral, and two less in the anal fin, and measures 30¼ inches in length, and 16 inches in girth, and his weight is 11lbs. We will now open them. The stomach of the salmon, you perceive, contains nothing but a little yellow fluid, and, though the salmon is twice as large, does not exceed much in size that of the trout. The stomach of the trout, unlike that of the salmon, will be found full of food: we will open it. See, there are half digested sand eels which come out of it.

PHYS.—But surely the stomachs of salmon must sometimes, when opened, contain food?

HAL.—I have opened ten or twelve, and never found anything in their stomachs but tape-worms,

* See Vignettes, p. 83.

bred there, and some yellow fluid; but, I believe this is generally owing to their being caught at the time of migration, when they are travelling from the sea upwards, and do not willingly load themselves with food. Their digestion appears to be very quick, and their habits seem to show, that after having taken a bait in the river they do not usually seek another till the work of digestion is nearly performed: but when they are taken at sea, and in rivers in the winter, food, I am told, is sometimes found in their stomachs.* The sea trout is a much more voracious fish, and like the land trout, is not willingly found with an empty stomach.

PHYS.—I presume the sea trout is the fish called by Linnæus, in his Fauna, *Salmo Eriox?*

HAL.—I know not: but I should rather think that fish a variety of the common salmon.†

PHYS.—But there are surely other species of salmon, that live in the sea and come into our rivers: I have heard of fish called *grays, bull trout, scurfs, morts, peales,* and *whitlings.*

HAL.—I have never been able to identify more than

* [By an experienced salmon fisher on the Tay, I have been informed that he often found food in the stomach of the Salmon, such as minnow, small trouts, and earth worms; and that not unfrequently he has witnessed it feeding greedily, taking a bait ravenously, not repulsed even by the prick of the hook.—J. D.]

† See note, p. 64.

the *salmo salar*, or salmon, and *salmo trutta*, or sea trout, in the rivers of Britain and Ireland. The whitlings I believe to be the young of the sea trout. A sea trout which I saw in Ireland, called a bull trout, was of the same kind as these you see here; but fresh water trout are sometimes carried in floods to the sea, and come back larger and altered in colour and form, and are then mistaken for new species: and as each river possesses a peculiar variety belonging to it, this, with differences depending upon food and size, will, I think, account for the peculiarities of particular fish, without the necessity of supposing them distinct species. I remember many years ago, the first time I ever fished for salmon in spring in the Tweed, I caught with the fly, one fine morning in March, two fish nearly of the same length: one was a male of the last season, that had lost its milt; the other a female fresh from the sea. They were so unlike, that they did not appear of the same species: the spent or kipper salmon was long and lean, showing an immense head, spotted all over with black and brown spots, and the belly almost black; the other bright and silvery, without spots, and the head small. Even the pectoral and anal fins had more spines in the newly run fish, some of the smaller ones having been probably rubbed off in spawning by the other. I would not for some time, till assured by an experienced fisherman, believe,

that the spent fish *was* a salmon. And when their flesh was compared on the table, one was white, flabby, and bad, and without curd; the other of the brightest pink, and full of dense curd. Then, though of the same length, one weighed only 4lbs., the other 9½lbs. When it is recollected, that different salmon and sea trout spawn at different times in the same river, and that fish of the same year, being born at different seasons, from Christmas to Lady-day,—and having migrated to the sea in spring *—run up the rivers of all sizes in summer and autumn—the young salmon from 2 to 10lbs. in weight, the young sea trout from ½ to 3 lbs. in weight—it is not difficult to account for the variety of names given by casual observers to individuals of these two species. But I must not forget my promise of sending a fish to the Highlander, with whose sport we have interfered. There is a good salmon, which shall be taken to him immediately, and for which I shall pay the taxman his usual price of 5*d.* per pound.

* [Relative to the length of time that the young of the salmon remain in fresh water, see additional note at the end of this volume. —J. D.]

Halstadt Lake and Town.—See Page 264.

FIFTH DAY.

HALIEUS—POIETES—ORNITHER—PHYSICUS.

Morning.

HAL.—Well, is your tackle all ready? It is a fine fresh and cloudy morning, with a gentle breeze—a day made for salmon fishing.

[*They proceed to the river.*]

HAL.—Now, my friends, I give up the two best pools to you till one o'clock: and I shall amuse

myself above and below—probably with trout fishing. As there is a promise of a mixed day, with—what is rare in this country—a good deal of sunshine, I will examine your flies a little, and point out those I think likely to be useful; or rather, I will show you my flies, and, as you all have duplicates of them, you can each select the fly which I point out, and place it in a part of the book where it may easily be found. First: when the cloud is on, I advise the use of one of these three golden twisted flies, with silk bodies, orange, red and pale blue, with red, orange, and gray hackle, golden pheasant's hackle for tail, and kingfisher's blue, and golden pheasant's brown hackle under the wing; beginning with the brightest fly, and changing to the darker one. Should the clouds disappear, and it become bright, change your flies for darker ones, of which I will point out three:—a fly with a brown body and a red cock's hackle, one with a dun body and black hackle and light wing, and one with a black body, a hackle of the same colour, and a brown mallard's wing. All these flies have, you see, silver twist round their bodies, and all kingfisher's feather under the wing, and golden pheasant's feather for the tail. For the size of your flies, I recommend the medium size, as the water is small to-day; but trying all sizes, from the butterfly size of a hook of half an inch in width, to one of a quarter. Now,

Physicus, cast your orange fly into that rapid at the top of the pool; I saw a large fish run there this moment. You fish well, were common trout your object; but, in salmon fishing, you must alter your manner of moving the fly. It must not float quietly down the water; you must allow it to sink a little, and then pull it back by a gentle jerk—not raising it out of the water,—and then let it sink again, till it has been shown in motion, a little below the surface, in every part of your cast. That is right,—he has risen.

PHYS.—I hold him. He is a noble fish!

HAL.—He is a large grilse, I see by his play. Hold him tight: he will fight hard.

PHYS.—There! he springs out of the water! Once, twice, thrice, four times! He is a merry one!

HAL.—He runs against the stream, and will soon be tired,—but do not hurry him. Pull hard now, to prevent him from running round that stone. He comes in. I will gaff him for you. I have him! A goodly fish of this tide. But see, Poietes has a larger fish at the bottom of the great pool, and is carried down by him almost to the sea.

POIET.—I cannot hold him! He has run out all my line.

HAL.—I see him: he is hooked foul, and I fear we shall never recover him, for he is going out to sea.

Give me the rod,—I will try and turn him; and do you run down to the entrance of the pool, and throw stones, to make him, if possible, run back. Ay! that stone has done good service; he is now running up into the pool again. Now call the fisherman, and tell him to bring a long pole, to keep him if possible from the sea. You have a good assistant, and I will leave you, for tiring this fish will be at least a work of two hours. He is not much less than 20 lbs. and is hooked under the gills, so that you cannot suffocate him by a straight line. I wish you good fortune; but should he turn sulky, you must not allow him to rest, but make the fisherman move him with the pole again; your chance of killing him depends upon his being kept incessantly in action, so that he may exhaust himself by exercise. I shall go and catch you some river trout for your dinner:—but I am glad to see, before I take my leave of you, that Ornither has likewise hold of fish,—and, from his activity, a lusty sea trout.

[*He goes, and returns in the afternoon.*]

HAL.—Well, Poietes, I hope to see your fish of 20 lbs.

POIET.—Alas! he broke me,—turned sulky, and went to the bottom; and when he was roused again, my line came back without the fly; so that I conclude

he had cut my links by rubbing them against some sharp stone. But I have caught two grilses and a sea trout since, and lost two others, salmons or grilses, that fairly got the hooks out of their mouths.

HAL.—And, Ornither, what have you done? Well, I see,—a salmon, a grilse, and a sea trout. And Physicus?

PHYS.—I have lost three fish; one of which broke me, at the top of the pool, by running amongst the rocks; and I have only one small sea trout.

HAL.—Your fortune will come another day. Why, you have not a single crimped fish for dinner, and it is now nearly two o'clock; and you have been catching for the picklers, for those fish may all go to the boiling-house. I must again be your purveyor. Can you point out to me any part of this pool where you have not fished?

ALL.—No.

HAL.—Then I have little chance.

PHYS.—O yes! you have a charm for catching fish.

HAL.—Let me know what flies you have tried, and I may, perhaps, tell you if I have a chance. With my small bright humming-bird, as you call it, I will make an essay.

POIET.—But this fishery is really very limited: and two pools for four persons a small allowance.

HAL.—If you could have seen this river twenty

years ago, when the cruives were a mile higher up, then you might have enjoyed fishing. There were eight or ten pools of the finest character possible for angling, where a fisherman of my acquaintance has hooked thirty fish in a morning. The river was then perfect, and it might easily be brought again into the same state: but even as it is now, with this single good pool and this second tolerable one, I know no place where I could, in the summer months, be so secure of sport as here—certainly no where in Great Britain.

POIET.—I have often heard the Tay and the Tweed vaunted as salmon rivers.

HAL.—They were good salmon rivers, and are still very good, as far as the profit of the proprietor is concerned; but, for angling, they are very much deteriorated. The net fishing, which is constantly going on, except on Sundays and in close time, suffers very few fish to escape; and a Sunday's flood offers the sole chance of a good day's sport, and this only in particular parts of these rivers.* I remember the Tweed and the Tay in a far better state. The Tweed, in the late Lord Somerville's time,

* [It is stated by Mr. Young, in his valuable little treatise, "Natural History of the Salmon," that in 1812, when stake nets were in full operation at the mouth of the Tay, the rents of the whole of that river above Newburgh had fallen to the sum of 5,100*l.*; and

always contained taking-fish after every flood in the summer. In the Tay, only ten years ago, at Micklevre, I was myself one of two anglers who took eight fine fish, three of them large salmon, in a short morning's fishing; but now, except in spring fishing, when the fish are little worth taking, there is no certainty of sport in these rivers; and one, two, or three fish (which last is of rare occurrence), are all that even an experienced angler can hope to take in a day's skilful and constant angling.

that seven years after, viz., in 1819, they had risen to 14,627*l.*—the stake nets having been removed by law as illegal obstructions.

Considering the great deterioration of the majority of salmon rivers, and the danger there is of their utter ruin if a reform in the manner of fishing them be not effected, surely the subject is deserving of, and urgently requires, the immediate attention of the legislature; and now that the habits of the salmon, and its peculiarities, are better known, were competent naturalists consulted in preparing a bill, there could hardly be any difficulty in forming an effective one for the regulation of the salmon fisheries.

A new bill is reported to be in preparation for the Scotch rivers, with this intent, to make the close time earlier, except for rod fishing, and protracting the time of the latter, so as to allow of more fish running up to breed, and promoting the early, the most safe and productive breeding, not endangered by winter floods and ice, and giving the proprietors of the higher streams, and the streams where the fish breed, an interest in preserving them.

If this bill be approved, and succeed, it is to be hoped that a measure of a similar kind will be adopted for the English rivers; for many of which it is much more needed than for the Scotch. See additional note at the end of the volume, relative to the facts recently ascertained respecting the salmon.—J. D.]

POIET.—You have fished in most of the salmon rivers of the north of Europe—give us some idea of the kind of sport they afford.

HAL.—I have fished in some, but perhaps not in the best; for this it is necessary to go into barbarous countries—Lapland, or the extreme north of Norway; and I have generally loved too much the comforts of life to make any greater sacrifices than such as are made in our present expedition. I have heard the river at Drontheim boasted of as an excellent salmon river, and I know two worthy anglers who have tried it; but I do not think they took more fish in a day than I have sometimes taken in Scotland and Ireland. All the Norwegian rivers that I tried, and they were in the south of Norway, contained salmon. I fished in the Glommen, one of the largest rivers in Europe; in the Mandals, which appeared to me the best fitted for taking salmon; the Arendal and the Torrisdale. But, though I saw salmon rise in all these rivers, I never took a fish larger than a sea trout; of these I always caught many—and even in the *fiords*, or small inland salt-water bays; but I think never any one more than a pound in weight. It is true I was in Norway in the beginning of July, in exceedingly bright weather, and when there was no night; for even at twelve o'clock the sky was so bright, that I read the smallest print in the columns of a

newspaper. I was in Sweden later, in August; I fished in the magnificent Gotha, below that grand fall Trolhetta, which to see is worth a voyage from England, but I never raised there any fish worth taking; yet a gentleman from Gothenburg told me he had formerly taken large trout there. I caught, in this noble stream, a little trout about as long as my hand; and the only fish I got to eat at Trolhetta was bream. The Falkenstein, a darker water, very like a second-rate Scotch river — say the Don — abounds in salmon; and there I had a very good day's fishing. I took six fish, which gave me great sport; they were grilses, under 6lbs.; but I lost a salmon, which I think was above 10lbs. This river, I conceive, must be generally excellent; it is not covered with saw-mills, like most of the Norwegian rivers; its colour is good, and it is not so clear as the rivers of the south of Norway.

PHYS.—Do you think the saw-mills hurt the fishing?

HAL.—I do not doubt it. The immense quantity of sawdust which floats in the water, and which forms almost hills along the banks, must be poisonous to the fish, by sometimes choking their gills, and interfering with their respiration. I have never fished for salmon in Germany. The Elbe and the Weser, when I have seen them, were too foul for

fly-fishing. And in the Rhine, in Switzerland, and its tributary streams, I have never seen a salmon rise. I once hooked a fish, under the fall at Schaffhausen, which, in my youthful ardour, I thought was a salmon, but it turned out to be an immense chub —a villanous and provoking substitute. Our islands, as far as I know, may claim the superiority over all other lands for this species of amusement. In England it is, however, a little difficult to get a day's salmon fishing. The best river I know of is the Derwent, that flows from the beautiful lake of Keswick; I caught once, in October, a very large salmon there, and raised another; but it is only late in the autumn that there is any chance of sport, though I have heard the spring salmon fishing boasted of. At Whitwell, in the Hodder, I have heard of salmon and sea trout being taken—but I have never fished in that river. The late Lord Bolingbroke caught many salmon at Christchurch; but a fish a week is as much as can be expected in that beautiful, but scantily stocked, river. Small salmon and sea trout, or *sewens*, as they are called in the country, may be caught after the autumnal floods, I believe, in most of the considerable Welsh, Devonshire, and Cornish streams; but I have fished in many of them without success. The Conway I may except; this river, in the end of October, will some-

times, after a great flood, furnish a good day's sport; and, if the net fishers could be set aside, several days' sport. I have known two salmon, one above 20lbs., taken there in a day; and I have taken myself fine sea trout, or *sewens*, which, in an autumnal flood in Wales, are found in most of the streams near the sea.

POIET.—I have heard a Northumberland man boast of the rivers of that county, as affording good salmon fishing.

HAL.—I have no doubt that salmon are sometimes caught in the Tyne, the Coquet, and the Till; but, in the present state of these rivers, this is a rare occurrence. I was once, for a week, on a good run of the North Tyne; I fished sometimes, but I never saw a salmon rise; and the only place in this river, where, from my own knowledge, I can assert salmon have been caught with the artificial fly, was at Mounsey, very high up the river. There, in 1820, two grilses were caught, in the end of August. I have recorded this as a sort of historical occurrence; and I dare say most of the counties of England, in which there are salmon rivers, would, upon a minute inquiry, furnish such instances, if they contained salmon fishers. Yorkshire, Devonshire, and Cornwall, with the sea on both sides, ought to furnish a greater number.

PHYS.—Give us some little account of the Scotch and Irish rivers.

HAL.—I fear I shall tire you by attempting any details on this subject, for they are so many, that I ought to take a map in my hands; but I will say a few words on those in which I have had good sport. First, the Tweed:—of this, as you will understand from what I mentioned before, I fear I must now say "*fuit.*" Yet still, for spring salmon fishing, it must be a good river. The last great sport I had in that river was in 1817, in the beginning of April. I caught, in two or three hours, at Merton, four or five large salmon, and as many in the evening at Kelso—and one of them weighed 25lbs. But this kind of fishing cannot be compared to the summer fishing: the fish play with much less energy, and in general are in bad season; and the fly used for fishing is almost like a bird—four or five times larger than the summer fly, and the coarsest tackle may be employed. I have heard, that Lord Home has sometimes taken thirty fish in a day, in spring fishing. About, and above Melrose, I have taken, in a morning in July, two or three grilses; and in September the same number. I have known eighteen taken earlier, by an excellent salmon fisher, at Merton; and the late Lord Somerville often took six or seven fish in a day's angling. The same "*fuit*" I must apply to most of the Scotch rivers. Of the Tay I have already spoken. In the Dee I have never caught salmon, though I

have fished in two parts of it, but it was in bad seasons. In the Don I have seen salmon rise, and hooked one, but never killed a fish. In the Spey I enjoyed one of the best day's sport (perhaps the very best) I ever had in my life: it was in the beginning of September, in close time; the water was low, and as net fishing had been given over for some days, the lower pools were full of fish. By a privilege, which I owed to the late Duke of Gordon, I fished at this forbidden time, and hooked twelve or thirteen fish in one day. One was above 30lbs., but it broke me by the derangement of my reel. I landed seven or eight,—one above 20lbs., which gave me great play in the rapids above the bridge. I returned to the same spot in 1813, the year after: the river was in excellent order, and it was the same time of the year, but just after a flood,—I caught nothing; the fish had all run up the river; the pools, where I had such sport the year before, were empty. I have fished there since, with a like result,—but this was before the 12th of August, the close day. In the Sutherland and Caithness rivers, many salmon, I have no doubt, may still be caught. The Brora, Sutherland, in 1813 and 1814, was an admirable river: I have often rode from the mansion of the princely and hospitable lord and lady of that county, after breakfast, and returned at two or three o'clock, having taken from three to

eight salmon—several times eight. There were five pools below the wears of the Brora, which always contained fish; and at the top of one pool, which from its size was almost inexhaustible, I have taken three or four salmon the same day. Another pool, nearer the sea, was almost equal to it; and at that time I should have placed the Brora above the Ewe for certainty of sport. When I fished there last, in 1817, the case was altered, and I caught only two or three fish in the very places where I had six years before been so successful. In the Helmsdale there are some good pools, and I have caught fine fish there when the river has been high. I have fished in the river at Thurso, but without success—it was always foul when I made my attempt. I have heard of a good salmon river in Lord Reay's country, the Laxford; its name, of Norwegian origin, would seem to be characteristic.* Along the coast of Scotland, most of the streams, if taken at the right time, afford sport. In this country the Beauly is a good river, and I have caught salmon in that very beautiful spot below the falls of Kilmornack. The Ness, at Inverness, and the Awe, and Lochy, I have fished in, but without success. I may say the same of the Ayr, and of the rivers which empty themselves into the Solway Frith. A little preserved stream, at Ardgowan, was

* *Lax* is the Teutonic word for salmon.

formerly excellent, after a flood in September, for sea trout, and later for salmon: I have had good sport there, and some of my friends have had better.

In Ireland there are some excellent rivers; and, what you will hardly believe possible, comparing the characters of the two nations, some of them are taken better care of than the Scotch rivers; which arises a good deal from the influence of the Catholic priests, when they are concerned in the interests of the proprietors, on the Catholic peasantry. I should place the Erne, at Ballyshannon, as now the first river, for salmon fishing from the banks with a rod, in the British dominions; and the excellent proprietor of it, Dr. Sheil, is liberal and courteous to all gentlemen fly-fishers. The Moy, at Ballina, is likewise an admirable salmon river; and sport, I believe, may almost always be secured there in every state of the waters; but the best fishing can only be commanded by the use of a boat. I have taken in the Erne two or three large salmon in the morning; and in the Moy, three or four grilses, or, as they are called in Ireland, *grauls;* and this was in a very bad season for salmon fishing. The Bann, near Coleraine, abounds in salmon: but, in this river, except in close time, when it is unlawful to fish there, there are few good casts. In the Bush, a small river about seven miles to the east of the Bann, there is admirable salmon

fishing always after great floods, but in fine and dry weather it is of little use to try. I have hooked twenty fish in a day, after the first August floods, in this river; and, should sport fail, the celebrated Giant's Causeway is within a mile of its mouth, and furnishes to the lovers of natural beauty, or of geological research, almost inexhaustible sources of interest. The Blackwater, at Lismore, is a very good salmon river: and the Shannon, above Limerick and at Castle Connel, whenever the water is tolerably high, offers many good casts to the fly-fisher; but they can only be commanded by boats. But there is no considerable river along the northern or western coast, —with the exception of the Avoca, which has been spoiled by the copper mines,—that does not afford salmon, and, if taken at the proper time, offer sport to the salmon fisher.—But it is time for us to return to our inn.

THE INN.

POIET.—Should it be a fine day to-morrow, I think we shall have good sport; the high tide will bring up fish, and the rain and wind of yesterday will have enlarged the river.

HAL.—To-morrow we must not fish; it is the Lord's day, and a day of rest. It ought likewise to

be a day of worship and thanksgiving to the Great Cause of all the benefits and blessings we enjoy in this life, for which we can never sufficiently express our gratitude.

POIET.—I cannot see what harm there can be in pursuing an amusement on a Sunday, which you yourself have called innocent, and which is apostolic: nor do I know a more appropriate way of returning thanks to the Almighty Cause of all being, than in examining and wondering at his works in that great temple of nature, whose canopy is the sky, and where all the beings and elements around us are as it were proclaiming the power and wisdom of Deity.

HAL.—I cannot see how the exercise of fishing can add to your devotional feelings; but, independent of this, you employ a servant to carry your net and gaff, and he, at least, has a right to rest on this one day. But even if you could perfectly satisfy yourself as to the abstracted correctness of the practice, the habits of the country in which we now are, form an insurmountable obstacle to the pursuit of the amusement: by indulging in it, you would excite the indignation of the Highland peasants, and might perhaps expiate the offence by a compulsory ablution in the river.

POIET.—I give up the point: I make it a rule never to shock the prejudices of any person, even

when they appear to me ridiculous; and I shall still less do so in a case where your authority is against me; and I have no taste for undergoing persecution, when the cause is a better one. I now remember, that I have often heard of the extreme severity with which the sabbath discipline is kept in Scotland. Can you give us the reason of this?

HAL.—I am not sufficiently read in the Church History of Scotland to give the cause historically; but I think it can hardly be doubted, that it is connected with the intense feelings of the early Covenanters, and their hatred with respect to all the forms and institutes of the Church of Rome, the ritual of which makes the Sunday more a day of innocent recreation than severe discipline.

PHYS.—Yet the disciples of Calvin, at Geneva, who, I suppose, must have hated the pope as much as their brethren of Scotland, do not so rigidly observe the Sunday; and I remember having been invited by a very religious and respectable Genevese to a shooting party on that day.

HAL.—I think climate and the imitative nature of man modify this cause abroad. Geneva is a little state, in a brighter climate than Scotland, almost surrounded by Catholics, and the habits of the French and Savoyards must influence the people. The Scotch, with more severity and simplicity of

manners, have no such examples of bad neighbours, for the people of the north of England keep the Sunday much in the same way.

POIET.—Nay, Halieus, call them not bad neighbours; recollect my creed, and respect at least, what, if error, was the error of the western Christian world for 1000 years. The rigid observance of the seventh day appears to me rather a part of the Mosaic, than of the Christian dispensation. The Protestants of this country consider the Catholics bigots, because they enjoin to themselves and perform certain penances for their sins; and surely the Catholics may see a little still more resembling that spirit, in the interference of the Scotch in innocent amusements, on a day celebrated as a festive day, that on which our Saviour rose to immortal life, and secured the everlasting hopes of the Christian. I see no reason why this day should not be celebrated with singing, dancing, and triumphal processions, and all innocent signs of gladness and joy. I see no reason why it should be given up to severe and solitary prayers, or to solemn and dull walks; or why, as in Scotland, whistling even should be considered as a crime on Sunday, and humming a tune, however sacred, out of doors, as a reason for violent anger and persecution.

ORN.—I agree with Poietes, in his views of the subject. I have suffered from the peculiar habits of

the Scotch Church, and therefore may complain. Once in the north of Ireland, when a very young man, I ventured after the time of divine service to put together my rod, as I had been used to do in the Catholic districts of Ireland, and fish for sea trout in the river at Rathmelton, in pure innocence of heart, unconscious of wrong; when I found a crowd collect round me—at first I thought from mere curiosity, but I soon discovered I was mistaken; anger was their motive, and vengeance their object. A man soon came up, exceedingly drunk, and began to abuse me by various indecent terms,—such as a Sabbath breaking papist, &c. It was in vain I assured him I was no papist, and no intentional Sabbath breaker; he seized my rod and carried it off with imprecations; and it was only with great difficulty, that I recovered my property. Another time I was walking on Arthur's Seat, with some of the most distinguished professors of Edinburgh attached to the geological opinions of the late Dr. Hutton; a discussion took place upon the phenomena presented by the rocks under our feet, and, to exemplify a principle, Professor Playfair broke some stones, in which I assisted the venerable and amiable philosopher. We had hardly examined the fragments, when a man from a crowd, who had been assisting at a field preaching, came up to us and warned us off,

saying, "Ye think ye are only stane breakers, but I ken ye are Sabbath breakers, and ye deserve to be staned with the stanes ye are breaking!"

HAL.—Zeal of every kind is sometimes troublesome, yet I generally suspect the persons, who are *very* tolerant, of scepticism. Those who firmly believe, that a particular plan of conduct is essential to the eternal welfare of man, may be pardoned if they show even *anger*, when this conduct is not pursued. The severe observance of the Sabbath is connected with the vital creed of these rigid presbyterians; it is not therefore extraordinary, that they should enforce it even with a perseverance that goes beyond the bounds of good manners and courtesy. They may quote the example of our Saviour, who expelled the traders from the Temple even by violence.

PHYS.—I envy no quality of the mind or intellect in others, be it genius, power, wit, or fancy: but if I could choose what would be most delightful, and I believe most useful to me, I should prefer a firm religious belief to every other blessing: for it makes life a discipline of goodness; creates new hopes, when all earthly hopes vanish; and throws over the decay, the destruction of existence, the most gorgeous of all lights; awakens life even in death, and from corruption and decay calls up beauty and divinity; makes an instrument of torture and of shame the

ladder of ascent to paradise; and, far above all combinations of earthly hopes, calls up the most delightful visions of palms and amaranths, the gardens of the blest, the security of everlasting joys, where the sensualist and the sceptic view only gloom, decay, annihilation, and despair!

POIET.—You transiently referred, Halieus, yesterday, to that instinct of salmons which induces them to run up rivers from the sea on the approach of rain. You have had so many opportunities of attending to the instincts of the inferior animals, that I should be very glad to hear your opinion on that very curious subject—the nature and development of instincts in general.

HAL.—You must remember, that, in the conversation to which you allude, I avoided even to pretend to define the nature of instinct; but I shall willingly discuss the subject; and I expect from yourself, Ornither, and Physicus, more light thrown upon it than I can hope to bestow.

ORN.—I believe we have each a peculiar view on this matter. In discussion we may enlighten and correct each other. For myself, I consider instincts merely as results of organisation, a part of the machinery of organised forms. Man is so constituted, that his muscles acquire their power by habit; their motions are at first automatic, and become voluntary

by associations, so that a child must learn to walk as he learns to swim or write; * but in the colt or chicken, the limbs are formed with the powers of motion; and these animals walk as soon as they have quitted the womb or the egg.

PHYS.—I believe it possible that they may have acquired these powers of motion in the embryo state; and I think I have observed, that birds learn to fly, and acquire the use of their wings, by continued efforts, in the same manner as a child does that of his limbs.

ORN.—I cannot agree with you; the legs of the fœtus are folded up in the womb of the mare; and neither the colt nor the chicken can ever have performed, in the embryo state, any motions of their legs similar to those which they have perfectly at their command when born. Young birds cannot fly as soon as they are hatched, because they have no wing feathers; but as soon as these are developed, and even before they are perfectly strong, they use their wings, fly, and quit their nests without any education from their parents. Compare a young quail, when a

* [But it cries and sucks, and each with as perfect effect, at the instant of birth, as days or weeks after,—its organs at the time of birth, being sufficiently developed for these its needs,—one to excite the mother's regards, the other to support life.—Both acts may perhaps be considered instinctive, being complete without teaching or thought; and so in accordance with the reasoning in the text.—J.D.]

few days old, with a child of as many months: he flies, runs, seeks his food, avoids danger, and obeys the call of his mother; whilst a child is perfectly helpless, and can perform few voluntary motions; has barely learnt to grasp, and can neither stand nor walk. But to see the most perfect instance of instinct, as contrasted with acquired knowledge, look at common domestic poultry: as soon as they are excluded from the egg, they run round their mother, nestle in her feathers, and obey her call, without education: she leads them to some spot where there is soft earth or dung, and instantly begins scratching with her feet; the chickens watch her motions with the utmost attention; if an earth-worm or larva is turned up, they instantly seize and devour it, but they avoid eating sticks, grass, or straws: and though the hen shows them the example of picking up grain, they do not imitate her in this respect, but for some days prefer ants, or the larvæ of ants, to a barley-corn. They may have heard the cluck of their mother in the egg, and having felt the warmth of her feathers agreeable, so you may consider, Physicus, their collecting under her wings, and obeying her call, as an acquired habit. But I will mention another circumstance, where habit or education is entirely out of the question. Does the mother see the shadow of a kite on the ground, or hear his scream in the air, she

instantly utters a shrill suppressed cry; the chickens, though born that day, and searching round her with glee and animation for the food which her feet were providing for them, instantly appear as if thunder-struck; those close to her crouch down and hide themselves in the straw; those further off, without moving from the place, remain prostrate; the hen looks upward with a watchful eye; nor do they resume their feeding till they have been called again by the cluck of their mother, and warned that the danger is over.

PHYS.—I certainly cannot explain the acquaintance of the little animals with the note of alarm of the mother, except upon the principle you have adopted; and I fairly own, that their selection of animal food appears likewise instinctive; yet it is possible, that this selection may depend upon some analogy between the smell of these animal matters and the yolk, which was for a long time their food in the egg.

ORN.—I find I must multiply examples. Examine young ducks which have been hatched under a hen: they no sooner quit the shell, than they fly to their natural element, the water, in spite of the great anxiety and terror of their foster-parent, who in vain repeats that sound to which her natural children are so obedient. Being in the water, they seize insects of every kind, which they can only know from their

instincts to be good for food; and when they are hatched in the May-fly season, they pursue these large ephemeræ with the greatest avidity, and make them their favourite food. It is impossible, I think, to explain these facts, except by supposing, that they depend upon feelings or desires in the animals developed with their organs, which are not acquired, and which are absolutely instinctive. I will mention another instance. A friend of mine was travelling in the interior of Ceylon; on the shore of a lake he saw some fragments of shells of the eggs of the alligator, and heard a subterraneous sound: his curiosity was excited, and he was induced to search beneath the surface of the sand: besides two or three young animals lately come from the shell, he found several eggs which were still entire: he broke the shell of one of them, when a young alligator came forth, apparently perfect in all its functions and motions; and when my friend touched it with a stick, it assumed a threatening aspect, and bit the stick with violence; and it made towards the water, which,—though born by the influence of the sunbeams on the burning sand,—it seemed to know was its natural and hereditary domain. Here is an animal which, deserted by its parents, and entirely submitted to the mercy of nature and the elements, must die if it had to acquire its knowledge; but all its powers are given, all its wants

supplied; and even its means of offence and defence implanted by strong and perfect instincts. I will mention one fact more. Swallows, quails, and many other birds migrate in large flocks when their usual food becomes scarce; and in these cases it may be said,—I anticipate a remark of Physicus,—that the phenomenon depends upon imitation, and that the young birds follow the old ones, who have before made the same flight. But I will select the young cuckoo for an unexceptionable example of the instinctive nature of this quality. He is produced from an egg deposited by his mother in the nest of another bird, generally the hedge-sparrow. He destroys all the other young ones hatched in the same nest, and is supplied with food by his foster-parent, after he has deprived her of all her natural offspring. Quite solitary, he is no sooner able to fly than he quits the country of his birth, and finds his way, with no other guide than his instinct, to a land where his parents had gone many weeks before him; and he is not pressed to make this migration by want of food, for the insects and grains on which he feeds are still abundant. The whole history of the origin, education, and migration of this singular animal, is a history of a succession of instincts, the more remarkable, because in many respects contrary to the usual order of nature.

PHYS.—I have been accustomed to refer many of the supposed instincts of animals, such as migrations, building nests, and selection of food, to imitation; but, I confess, I cannot explain the last fact you have brought forward on this principle. Pray, Ornither, let me state your view, as I understand it, that we may not differ as to the meaning of language. I conclude you adopt Hartley's view of association, that the motions of the muscles in man are first automatic, and become voluntary by association; and that reason is the application of voluntary motions for a particular end. For instance: a child is not afraid of fire, but, bringing its hand near the fire, it is burnt, and the convulsions of the muscles produced by the pain end in removing the hand from the source of pain. These motions by association are made voluntary; and after this experiment he avoids the fire by *reason*, and takes care always to perform those motions which remove his limbs from this destructive agent. But in contrasting instinct with this slow process, you would say, most animals, without having felt the effects of fire, have an innate dread of it; and in the same way, without having been taught, or experienced pleasure or pain from the object, young ducks seek the water, young chickens avoid it: their organs have a fitness or unfitness for certain functions, and they use them for these functions without education. In short, the

instinctive application of the organ is independent of experience, and forms part of a train of pure sensations.

ORN.—I have no objection to the statement you make of my view of the subject; but I certainly should give to it a little more refinement and generality. In all the results of reason, ideas are concerned, but never in those of instinct. Without memory there can be no reason; but in instinct nothing can be traced but pure sensation.

POIET.—Though in the animal world no ideas seem connected with instincts, yet they are all intended for specific and intelligent ends. Thus the swallow travels to a country where flies are found; the salmon migrates from the sea to the sources of fresh rivers, where its eggs may receive a supply of aërated water, and without this migration the race would be extinct: and in this way all the instincts of animals may be referred to intelligence, which, though not belonging to the animal, must be attributed to the Divine Mind. Is it not then reasonable to refer instinct to the immediate impulse of the Author of Nature upon his creatures? His omnipresence and omnipotence cannot be doubted, and to the Infinite Mind the past, the present, and the future are alike; and creative and conservative power must equally belong to it.

HAL.—That instincts depend upon impulses imme-

diately derived from the Deity is an opinion which, though it perhaps cannot be confuted, yet does not please me so much as to believe them dependent upon the formation of organs, and the result of the general laws which govern the system of the universe; and it is in favour of this opinion that they are susceptible of modifications. Thus, in domesticated animals they are always changed; the turkey and the duck lose their habits of constructing nests, and the goose does not migrate. In supposing them the result of organisation and hereditary, they might be expected to be changed by circumstances, as they are actually found to be. Without referring the instincts of animals to the immediate impulse of the Deity, they appear to me to offer the most irresistible and convincing argument that can be brought forward against atheism. They demonstrate combinations, the result of the most refined intelligence, which can only be considered as infinite. Take any one of the lowest class of animals, insects for instance, not only is their organisation fitted to all their wants, but their association in society is provided for, and the laws of a perfect social community, as it were, are adopted by beings that we are sure cannot reason. In the hive bee, for instance, the instinct of the workers leads them to adopt and obey a queen; and if she is taken away from them, or dies, they have

the power of raising another from offspring in the cells by an almost miraculous process: they work under her government for a common object, allow males only to exist for a specific purpose and limited time; and, under the government of females who preserve the society, they send forth swarms, which readily place themselves under the protection of man. In the geometrical construction of their cells, the secretion of wax from their bodies, the collecting their food, and the care of the brood, there is a series of results which it requires a strong reason to follow, and which are the consequences of invariable instincts. Bees, since they have been noticed by naturalists, have the same habits, and as it is probable that there have been many thousand of generations since the creation, it is evident that the instincts of the first bees have been hereditary and invariable in their offspring; and it cannot be doubted, that they do now, as they did four thousand years ago, make some cells in combs larger than others for the purpose of containing the eggs and future grubs of drones, that are to be produced by a grub, which they are educating for a queen bee; and that these cells are connected with the common cells by a series, in which the most exact geometrical laws of transition are observed. An eminent philosopher has deduced an argument in favour of the existence of Deity from the analogy of the universe

to a piece of mechanism, which could only be the work of an intelligent mind; but there is this difference: in all the productions of nature, the principle, not only of perfection, but likewise of conservation, is found, marking a species of intelligence and power which can be compared to nothing human. The first created swarm of bees contained beings provided with all the instincts necessary for the perpetual continuance of the species; and some of these instincts can scarcely be understood by man, requiring the most profound geometrical knowledge, even to calculate their results; and *other instincts* involve what in human society would be the most singular state of policy, combining contrasted moral causes and contradictory interests. It is impossible not to be lost in awe at the contemplation of this chain of facts; the human mind cannot fail to acknowledge in them the strongest proofs of their being produced by infinite wisdom and unbounded power; and the devout philosopher can scarcely avoid considering with respect a little insect, endowed with faculties producing combinations, which human reason vainly attempts to imitate, and can scarcely understand.

PHYS.—I agree with you, that if instinct be supposed the result of organisation, and that the first animal types were so created as to transmit their instincts invariably generation after generation, it does offer a most triumphant and incontrovertible argument for

the existence of an all-powerful intelligent Cause. Even in the instance which led to this conversation,—the instinct which carries salmon from the sea to the sources of rivers,—it is only lately philosophers have discovered, that the impregnated eggs cannot produce young fishes independent of the influence of air; and thus an animal goes many hundred miles under the direction of an instinct, the use of which human reason has at length developed, and man is supplied with an abundant food by the result of a combination, in consequence of which a species is preserved.

POIET.—I do not understand, Halieus, your objections to the view I have adopted, which is sanctioned by the authority of a good ethic philosopher, Addison. Allowing the omnipresence and constant power of Deity, I do not see how you can avoid admitting his actual interference in all the phenomena of living nature.

HAL.—As I said before, I cannot *confute* your view; but, upon this principle, gravitation and the motion of the planets round the sun, and all the other physical phenomena of the universe, would be owing to the immediate action of the Divinity. I prefer the view, which refers them to motion and properties, the results of general laws impressed on matter by Omnipotence. This view is, I think, simpler; but it is difficult to form any distinct opinion on so high and incomprehen-

sible a subject; on which, perhaps, after all, it is wiser to confess our entire ignorance, and to bow down in humble adoration to the one incomprehensible Cause of all being.

POIET.—I agree with you in your last sentence; but I still adhere to my own view; and I hope you will not object to a favourite opinion of mine, that instincts are to animals what revelation is to man, intended to supply wants in their physical constitution, which in man are provided for by reason; and that revelation is to him as an instinct, teaching him what reason cannot—his religious duties, the undying nature of his intellectual part, and the relations of his conduct to eternal happiness and misery.

HAL.—"Davus sum, non Œdipus." I will not attempt to discuss this view of yours, Poietes: but I think I may say, that all the instincts of animals seem to be connected with pleasure or utility; and in man the feeling of love and the gratifying the appetites which approach nearest to instincts, are likewise highly delightful; and perhaps there is no more pleasurable state of the human mind than when, with intense belief, it looks forward to another world and to a better state of existence, or is absorbed in the adoration of the supreme and eternal Intelligence.

The Teme. Grounds of Downton, from a sketch by Mrs. Stackhouse Acton.—See Page 175.

SIXTH DAY.

HALIEUS—POIETES—ORNITHER—PHYSICUS.

Morning.

HAL.—Well met, my friends; it is a fine warm morning, there is a fresh breeze, the river is in excellent order for fishing; and I trust our good behaviour yesterday will ensure us sport to-day. There must be a great many fresh run fish in the pool; and after twenty-four hours' rest, some of those that were indisposed to take on Saturday evening, may have acquired appetite. Prepare your tackle,

and begin; but whilst you are preparing, I will mention a circumstance which every accomplished fly-fisher ought to know. You changed your flies on Saturday with the change of weather, putting the dark flies on for the bright gleams of the sun, and the gaudy flies when the dark clouds appeared. Now, I will tell you of another principle, which it is as necessary to know as the change of flies for change of weather—I allude to the different kinds of fly to be used in particular pools, and even for particular parts of pools. You have fished in this deep pool; and if you were to change it for a shallower one, such as that above, it would be proper to use smaller flies of the same colour; and in a pool still deeper, larger flies: likewise in the rough rapid at the top, a larger fly may be used than below at the tail of the water: and in the Tweed or Tay, I have often changed my fly thrice in the same pool, and sometimes with success—using three different flies for the top, middle, and bottom. I remember that when I first saw Lord Somerville adopt this fashion, I thought there was fancy in it; but experience soon proved to me how accomplished a salmon fisher was my excellent and lamented friend; and I adopted the lesson he taught me, and with good results, in all bright waters.

POIET.—I will try the correctness of your principle.

Look at the fly now on my line; where would you recommend me to cast it?

HAL.—It is a large gaudy fly, and is fit for no part of this pool, except the extremely rough head of the torrent; there, I dare say, it will take in *this* state of the waters.

POIET.—Good, I hooked a large fish, but alas! he is off; yet I thought he was fairly caught.

HAL.—The hook, I think, turned round at the moment you struck, and carried off some scales from the outside of his mouth.

POIET.—You are right; see, the scales are on the hook. I cannot raise another fish; I have tried almost all over the pool. I thought I saw a fish rise at the tail of the rapid.

HAL.—You did; he refused the fly. Now put on a fly one third of the size and of the same colour, and I think you will hook that fish.

POIET.—I have done so; and he is fast—and a fine fish; I think a salmon.

HAL.—It is a salmon; and one above 10 lbs. Play him with care, and do not let him run into the rough part of the stream, where the large stones are.

POIET.—It is, I think, the most active fish I have yet played with. See how high he leaps! He is making for the sea.

HAL.—Hold him tight, or you will lose him.

POIET.—Fear me not. I trust, in spite of his strength, I shall turn him. You see, I show him the but of the rod, and his force is counterpoised by a very long lever.

HAL.—You do well. But he has made a violent spring, and, I fear, is off.

POIET.—He is; but not, I think, by any fault of mine. He has carried off something.

HAL.—You played that fish so well, that I am angry at his loss. Either the hook, link, or line, failed you.

POIET.—It is the hook, which you see is broken, and not merely at the barb, but likewise in the shank. What a fool I was ever to use one of these London or Birmingham-made hooks.

HAL.—The thing has happened to me often. I now never use any hooks for salmon fishing, except those which I am sure have been made by O'Shaughnessy, of Limerick; for even those made in Dublin, though they seldom break, yet they now and then bend: and the English hooks, made of cast steel in imitation of Irish ones, are the worst of all. *There* is a fly nearly of the same colour as that which is destroyed; and I can tell you, that I saw it made at Limerick by O'Shaughnessy himself, and tied on one of his own hooks. Should you catch with it a fish

even of 30 lbs. I will answer for its strength and temper—it will neither break nor bend.

POIET.—Whilst I am attaching your present, so kindly made, to my line, pray tell me how these hooks are made, for I know you interested yourself in this subject when at Limerick.

HAL.—Most willingly. I have even made a hook which, though a little inferior in form, in other respects, I think, I could boast of as equal to the Limerick ones. The first requisite in hook-making is to find good malleable iron of the softest and purest kind—such as is procured from the nails of old horse-shoes. This must be converted by cementation with charcoal into good soft steel, and that into bars or wires of different thickness for different sized hooks, and then annealed. For the larger hooks, the bars must be made in such a form as to admit of cutting the barbs; and each piece, which serves for two hooks, is larger at the ends, so that the bar appears in the form of a double pointed spear, three, four, or five inches long: the bars for the finer hooks are somewhat flattened. The artist works with two files, one finer than the other for giving the point and polishing the hook; and he begins by making the barb, taking care not to cut too deep and filing on a piece of hard wood, such as box wood, with a dent to receive the bar, made by the edge of the file.

The barb being made, the shank is thinned and flattened, and the polishing file applied to it; and by a turn of the wrist round a circular pincers, the necessary degree of curvature is given to it. The hook is then cut from the bar, heated red hot by being kept for a moment in a charcoal fire; then plunged, while hot, into cold water; then tempered, by being put on iron, that has been heated in the same fire till it becomes a bright blue, and, whilst still hot, it is immersed in candle-grease, where it gains a black colour; it is then finished.

PHYS.—Nothing seems simpler than this process. Surely London might furnish manufacturers for so easy a manipulation; and I should think one of our friends, who is so admirable a cutler, might even improve upon the Irish process; at least the tempering might be more scientifically arranged; for instance, by the thermometer and a bath of fusible metal, the temperature at which steel becomes blue being 580° Fah., might be constantly preserved.

HAL.—Habit teaches our Irish artists this point with sufficient precision. We should have such hooks in England, but the object of the fishing tackle makers is to obtain them cheap, and most of their hooks are made to sell, and good hooks cannot be sold but at a good price.

POIET.—I have heard formerly a good angler

complain, that the Limerick hooks were too heavy and clumsy. He preferred hooks made at Kendal in Westmoreland.

HAL.—I saw, twenty years ago, hooks far too heavy made at Limerick; but this O'Shaughnessy is, I think, a better maker than his father was, and the curve and the general form of the hook is improved. It has now, I think, nearly the best form of a curve for catching and holding,—the point protruding a little. The Kendal hook holds well, but is not so readily fixed by the pull in the mouth of the fish. The early Fellows of the Royal Society, who attended to all the useful and common arts, even improved fish hooks; and Prince Rupert, an active member of that illustrious body, taught the art of tempering hooks to a person of the name of Kirby; under whose name, for more than a century, very good hooks were sold. I shall take a walk towards the lake to enjoy a view of its cloud-capped mountains, and I hope to find, on my return, that you have all had your satisfaction in a good day's salmon fishing.

PHYS.—We shall crimp and cool a salmon if we catch a good one, for our dinner.

HAL.—Do so.

ORN.—But before you leave us, I wish you would be good enough to inform us why the salmon here are so different from those I have seen elsewhere:

for instance, some caught in the Alness, in Rosshire, which we saw in passing round the south coast of Ross. These appear to me thicker and brighter fish, and one that I measured was 30 inches long, and 17 in circumference.

HAL.—I think I have seen broader fish than even those of this river; but the salmon which you happen to remember for comparison, belonged to a small stream, which, I think, in general are thinner and longer than those in great rivers; and what I mentioned on a former occasion with respect to trout holds good likewise with regard to salmon; each river has a distinct kind. It is scarcely possible to doubt, that the varieties of the salmon, which haunt the sea, come to the same rivers to breed in which they were born, or where they have spawned before.*

[* This is also the conviction of Mr. Young, the most experienced of the experienced in matters relating to the salmon. In his "Natural History of the Salmon," he gives a remarkable instance in proof. "We know (he says) of five rivers which run into the same estuary, and all and each of these rivers have their own particular salmon, and the fish differ so much the one from the other, that they are quite easily distinguished. The first river which falls into the estuary of which we speak, has a race of well-shaped salmon, whose average weight is about ten pounds; the second river has a strong, coarse scaled, rather long, but very hardy salmon, whose average weight is about seventeen pounds; the third river has a middling shaped salmon, whose average weight is about nine pounds; the fourth river has long, ill-shaped salmon, averaging about eight pounds; and the fifth river has a very well-shaped salmon, whose

And this could hardly happen unless they confined their migrations to a certain space in the sea, the boundaries of which may be regarded as the shore and the deep water, which may be considered as effectual a limit almost as land; for fish do not willingly haunt *very* deep water, that being even in summer of low temperature, approaching to 40°, and containing little or no vegetable food or insects, which the smaller fishes search for, and the larger fishes follow the smaller. It is however possible, that in winter, all fish fond of heat will seek water rather deeper than in summer; and charr and umbla in lakes are usually found in the deepest parts, being fond of *cool* water, and they come to spawn whenever the shallow water of the lakes becomes cool, in October or November. We cannot judge of the senses of animals that breathe water,—that separate air from water by their gills; but it seems probable, that, as the quality of the water is connected with their life and health, they must be exquisitely sensible to changes in water, and must have similar relations to it that an animal with the most delicate nasal organs has to air. A vulture or a dog scents not

average weight is fully fourteen pounds." He adds, that it is rare indeed for a fish returning through the common estuary, to miss its way to its own river, even when first returning as a grilse,—a fact in favour of the explanation given by the author of the occurrence.—J.D.]

only particular food and particular game at great distances, but even makes of the smell a kind of language; and I doubt not, that when dogs, that have been blindfolded and carried away from their home, return to it, it is by the sense of smelling,—to them each town, lane, or field, must have a particular scent. A case has been related to me of a dog carried in a covered basket from Badula to Kandy, a distance of 45 miles, over a road he had never travelled before, and who returned to the spot from which he was taken in 24 hours, through the wildest parts of the mountainous district of Ceylon. And I have seen even a blind horse, an animal in which the sense of smelling is less acute, evidently find his way by it to his master's house and stable, which was, indeed, near a tan-yard. The state of parts of water, in the sea or great lakes, produced by the impregnations carried down by particular streams, is much more permanent than a *like state* in air; so that though the knowledge given by the nasal organs may be more easily communicated at a distance by winds, yet *that* produced by streams on the branchiæ of fishes is more invariable, and a migratory fish is less likely to be deceived. Yet in great floods, often connected with storms, or violent motion in the waters near the shore, salmon sometimes mistake their river. I remember in this way, owing to a

tremendous flood, catching with the fly a large salmon, that had mistaken his river, having come into the Bush, near the Giant's Causeway, instead of the Bann. No fish can be more distinct in the same species than the fish of these two rivers, their length to their girth being nearly in a ratio of 20 : 9 and 20 : 13.*—I am going; good sport to you.

EVENING.

HAL.—I am sure I may congratulate you on your sport, for I see on the bank a fine salmon, three grauls or grilses, and three large sea trout.

ORN.—You have not seen all, for we have crimped two fish—one a large salmon, and the other a trout almost a yard long, and both in excellent season. We have had great sport, and sport even of a kind

[* A striking example of a migratory fish losing its way, came to my knowledge in Malta. I was assured there by a gentleman, who had made Icthyology a special study, that he once saw a salmon, brought for sale into the market of Valetta, which had been caught in the sea washing that island. Now, as there are no rivers flowing into the Mediterranean resorted to by this fish for breeding in, it may be inferred, that the fish in question was a stray one that had lost its way in the Atlantic, and had entered the Mediterranean by mistake in the current from the ocean flowing through the Gut of Gibraltar. By similar accidents it is easy to comprehend how all rivers communicating with the ocean, fit by the qualities of their waters, may become the habitual resort and breeding streams of migratory fish.—J.D.]

which you will not guess at; for, when the tide was falling, the fish ceased to rise at the fly, and I thought of trying them with a bait; so we sent for our swivel tackle, and put parr or samlet on our hooks, as we bait for pike—cutting off one ventral fin on one side, and one pectoral fin on the other; and making the parr spin in the most rapid streams, we had several runs from fish, and it was in this way that Poietes caught this large sea trout, which gave excellent sport.

HAL.—This kind of fishing is not uncommon. I have often caught salmon in the Tay, fishing with parrs; but though the fish ran at the bait, when they would not rise at the fly while the tide was ebbing, they would have taken the parr better still while it was flowing.

PHYS.—From my experience to-day, I conclude the salmon has habits different from the trout; for I think the fish which broke my hook rose again at the artificial fly in the same place.

HAL.—I think you are mistaken. Salmon are usually shyer even than trout, and I never knew one in this season, that had been pricked even slightly, rise again at the artificial fly in the same pool. I should say, that their habits are precisely the same, but with more sagacity on the side of the salmon. It must have been another fish that rose at your fly in the same place. After such severe discipline, I do

not think a fish would rise for many hours, even at a natural bait.

POIET.—Your experience is so great, that I dare say I was mistaken, yet it seemed a fish of the same size.

HAL.—Salmon often in this season haunt the streams in pairs; but so far from rising again after being pricked, they appear to me to learn, when they have been some time in the river, that the artificial fly is not food, even without having been touched by the hook. In the river at Galway, in Ireland, I have seen above the bridge some hundreds of salmon lying in rapid streams, and from five to ten fishermen tempting them with every variety of fly, but in vain. After a fish had been thrown over a few times, and risen once or twice and refused the fly, he rarely ever took any notice of it again in that place. It was generally nearest the tide that fish were taken, and the place next the sea was the most successful stand, and the most coveted; and when the water is low and clear in this river, the Galway fishermen resort to the practice of fishing with a naked hook, endeavouring to entangle it in the bodies of the fish;—a most unartist-like practice. In spring fishing, I have known a hungry, half-starved salmon rise at the artificial fly a second time, after having been very slightly touched by it; but even this rarely happens, and when I have seen it, the water has been coloured.

PHYS.—Can you tell us why the fish rise better at the fly when the tide is flowing, than when it is ebbing? There seems no reason why flies should be sought for by the fish at one of these seasons, rather than at the other.

HAL.—The turn of the salt water brings up aquatic insects, and perhaps small fish; and I suppose salmon know this, and search for food at a time when it is likely to be found. I cannot think, that in these pools they can be on the look-out for flies, for there are never any on the surface of the water; and I imagine they take the gaudy fly, with its blue kingfisher and golden pheasant's feathers, for a small fish.

ORN.—I have always supposed, that they took it for a libellula, or dragon-fly; for I have often seen these brilliant flies haunting the water.

HAL.—I never saw a dragon-fly drop on the water, or taken by a fish; and salmon sometimes rise even in the salt water, where dragon-flies are never found. There is no difficulty in explaining why salmon in inland rivers should take flies, where natural flies are abundant; but fish, when they have lain long in pools in the river and fed on natural flies, will no longer take these bright flies, and then even a trout-fly is often most successful. I have sometimes thought that the rising of salmon and sea trout at these bright

flies, as soon as they come from the sea into rivers, might depend upon a sort of imperfect memory of their early food and habits; for flies form a great part of the food of the salmon fry, which, before migrating to the sea, feed like young trouts; flies are their principal nourishment; and in going back to fresh water, they may perhaps have their habits of feeding recalled to them, and naturally search for their food at the surface.

POIET.—This appears to me very probable.—But it is late, and we must return and compare the crimped trout and salmon; and I hope we shall have another good day to-morrow, for the clouds are red in the west.

PHYS.—I have no doubt of it, for the red has a tint of purple.

HAL.—Do you know why this tint portends fine weather?

PHYS.—The air, when dry, I believe, refracts more red, or heat-making, rays; and as dry air is not perfectly transparent, they are again reflected in the horizon. I have generally observed a coppery or yellow sunset to foretel rain; but, as an indication of wet weather approaching, nothing is more certain than a halo round the moon, which is produced by the precipitated water; and the larger the circle, the nearer the clouds, and consequently the more ready to fall.

HAL.—I have often observed, that the old proverb is correct—

> A rainbow in the morning is the shepherd's warning:
> A rainbow at night is the shepherd's delight.

Can you explain this omen?

PHYS.—A rainbow can only occur when the clouds containing, or depositing, the rain are opposite to the sun,—and in the evening the rainbow is in the east, and in the morning in the west; and as our heavy rains, in this climate, are usually brought by the westerly wind, a rainbow in the west indicates, that the bad weather is on the road, by the wind, to us; whereas the rainbow in the east proves, that the rain in these clouds is passing from us.

POIET.—I have often observed, that when the swallows fly high, fine weather is to be expected or continued; but when they fly low, and close to the ground, rain is almost surely approaching. Can you account for this?

HAL.—Swallows follow the flies and gnats, and flies and gnats usually delight in warm strata of air; and as warm air is lighter, and usually moister, than cold air, when the warm strata of air are high, there is less chance of moisture being thrown down from them by the mixture with cold air; but when the warm and moist air is close to the surface, it is

almost certain, that, as the cold air flows down into it, a deposition of water will take place.

POIET.—I have often seen sea-gulls assemble on the land, and have almost always observed, that then very stormy and rainy weather was approaching. I conclude, that these birds, sensible of a current of air flowing from the ocean, retire to the land to shelter themselves from the storm.

ORN.—No such thing. The storm is their element; and the little petrel enjoys the heaviest gale, because, living on the smaller sea insects, he is sure to find his food in the spray of a heavy wave—and you may see him flitting above the edge of the highest surge. I believe, that the reason of this migration of sea-gulls, and other sea birds, to the land, is their security of finding food. They may be observed, at this time, feeding greedily on the earth worms and larvæ, driven out of the ground by severe floods; and the fish, on which they prey in fine weather in the sea, leave the surface, when storms prevail and go deeper. The search after food, as we agreed on a former occasion, is the principal cause why animals change their places. The different tribes of the wading birds always migrate when rain is about to take place; and I remember once, in Italy, having been long waiting, in the end of March, for the arrival of the double snipe in the Campagna of Rome,

—a great flight appeared on the 3rd of April, and the day after heavy rain set in, which greatly interfered with my sport.* The vulture, upon the same principle, follows armies; and I have no doubt, that the augury of the ancients was a good deal founded upon the observation of the instincts of birds. There are many superstitions of the vulgar owing to the same source. For anglers, in spring, it is always unlucky to see single magpies,—but *two* may be always regarded as a favourable omen; and the reason is, that in cold and stormy weather one magpie alone leaves the nest in search of food, the other remaining sitting upon the eggs or the young ones; but when two go out together, the weather is warm and mild, and thus favourable for fishing.

POIET.—The singular connexions of causes and effects, to which you have just referred, make superstition less to be wondered at, particularly amongst the vulgar; and when two facts, naturally unconnected, have been accidentally coincident, it is not singular that this coincidence should have been

* [The snipe is common in Ceylon, and throughout the year, passing from one side of the island to the other, with the change of monsoon,—that monsoon, which, on one side, is accompanied by the rainy season, on the other bringing in the dry season;—thus affording a striking example of migration in connection with the cause, as intimated in the text,—a cause which seems to influence equally the human race and the brute, and may be held to be the general motive one; any other being the exception, rather than the rule.—J. D.]

observed and registered, and that omens of the most absurd kind should be trusted in. In the west of England, half a century ago, a particular hollow noise on the sea coast was referred to a spirit or goblin, called Bucca, and was supposed to foretel a shipwreck: the philosopher knows, that sound travels much faster than currents in the air—and the sound always foretold the approach of a very heavy storm, which seldom takes place on that wild and rocky coast, surrounded as it is by the Atlantic, without a shipwreck on some part of its extensive shores.

PHYS.—All the instances of omens you have mentioned are founded on reason; but how can you explain such absurdities as Friday being an unlucky day, the terror of spilling salt, or meeting an old woman? I knew a man, of very high dignity, who was exceedingly moved by these omens; and who never went out shooting without a bittern's claw fastened to his buttonhole by a riband, which he thought ensured him good luck.

POIET.—These, as well as the omens of death-watches, dreams, &c., are, for the most part, founded upon some accidental coincidences; but spilling of salt, on an uncommon occasion, may, as I have known it, arise from a disposition to apoplexy, shown by an incipient numbness in the hand, and may be a fatal symptom; and persons, dispirited by bad omens,

sometimes prepare the way for evil fortune; for confidence in success is a great means of ensuring it. The dream of Brutus, before the field of Philippi, probably produced a species of irresolution and despondency, which was the principal cause of his losing the battle. And I have heard, that the illustrious sportsman, to whom you referred just now, was always observed to shoot ill, because he shot carelessly, after one of his dispiriting omens.

HAL.—I have in life met with a few things, which I found it impossible to explain, either by chance coincidences or by natural connexions; and I have known minds of a very superior class affected by them; persons in the habit of reasoning deeply and profoundly.

PHYS.—In my opinion, profound minds are the most likely to think lightly of the resources of human reason; it is the pert superficial thinker who is generally strongest in every kind of unbelief. The deep philosopher sees chains of causes and effects so wonderfully and strangely linked together, that he is usually the last person to decide upon the impossibility of any two series of events being independent of each other; and in science, so many natural miracles as it were, have been brought to light—such as the fall of stones from meteors in the atmosphere, the disarming a thunder-cloud by a metallic point, the production

of fire from ice by a metal white as silver, and referring certain laws of motion of the sea to the moon,—that the physical inquirer is seldom disposed to assert, confidently, on any abstruse subjects belonging to the order of natural things, and still less so on those relating to the more mysterious relations of moral events and intellectual natures.

Leintwardine on the Teme, from a sketch by Mrs. Stackhouse Acton.

SEVENTH DAY.

HALIEUS—POIETES—ORNITHER—PHYSICUS.

GRAYLING FISHING.

SCENE—*Leintwardine, near Ludlow.*

TIME—*Beginning of October.*

HAL.—You have reached your quarters. Here is your home—a rural, peaceable, and unassuming inn, with as worthy a host and hostess as may be found in this part of the country. The river glides at the bottom of the garden, and there is no stream in

England more productive of grayling. The surrounding scenery is not devoid of interest, and the grounds in the distance are covered with stately woods, and laid out (or rather their natural beauties developed) by the hand of a master,* whose liberal and enlightened mind even condescended to regard the amusements of the angler; and he could hardly have contributed in a more effectual manner to their comforts, than by placing the good people, who were once his servants, in this comfortable inn.

PHYS.—Are we to fish according to any rule, as to quantity or size of fish?

HAL.—You are at perfect liberty to fish as you like; but as it is possible you may catch grayling only of this year, and which are not longer than the hand, I conclude you will return such pigmies to the river, as a matter of propriety, though not of necessity.

POIET.—This river seems formed of two other streams, which join above our inn. What are the names of its sources?

HAL.—The small river to the left is called the Teme, or Little Teme, and though the least stream, it gives name to the river: the other, and more copious stream, is called the Clun. The Little Teme

* [The late Thomas Andrew Knight, Esq., of Downton Castle, president for many years of the Horticultural Society, to whom an edition of the author's "Lectures on Agricultural Chemistry" was dedicated.]

contains principally trout; the Clun, both trout and grayling; but the fish are more abundant in the meadows, between this place and Downton, than in other parts of the river; for above, the stream is too rapid and shallow to be favourable to their increase; and below, it is joined by other streams, and becomes too abundant in coarse fish.

POIET.—I cannot understand why the grayling should be so scarce a fish in England. It is abundant in many districts on the Continent; but in this island it is found, I believe, only in a few rivers; and does not exist, I think, either in Ireland or Scotland. Yet, being an Alpine fish, and naturally fond of cool water, it might have been expected among the Highlands.

HAL.—I formerly used to account for this, by supposing it an *imported* fish, and not indigenous; but, in some of my continental excursions, I have seen it living only under such peculiar circumstances, that I doubt the correctness of this my early opinion.

POIET.—Which was, I conclude, that it was introduced by the monks, in the time when England was under the See of Rome. As a favourite fish of St. Ambrose it was worth cultivating, as well as for its own sake; and I think you have done wrong to relinquish this idea, for, as far as my recollection serves me, the rivers that contain it are near the ruins of great monasteries,—the Avon near Salisbury,

the Ure near Fountain's Abbey, the Wye near the great Abbey of Tintern; and, if I am not mistaken, in the lower part of this valley, there are the remains of an extensive establishment of friars.

HAL.—But there are rivers near the ruins of some of the most magnificent establishments of this kind in Europe, and those nearest the Continent, where the grayling is not found; for instance, in the Stour, at Canterbury. And if the grayling *be* an imported fish, it is wonderful, that it should not be found in the rivers in Kent, and along the south-west coast of England, as in Dorsetshire, Devonshire, and Cornwall, where the monastic establishments were numerous; and why it should be found in some rivers in the mountainous parts of Wales, as in that near Llan-wrtyd and the Dee—not near Val Crucis Abbey, but fifteen miles higher up, between Corwen and Bala.

POIET.—It may have been a fish imported from the Continent, and carried to a number of rivers, only a few of which may have suited its habits, and has remained there and multiplied.

HAL.—There may be truth in what you are now imagining, for the grayling requires a number of circumstances in a river to enable it to increase.

POIET.—What circumstances are these?

HAL.—A temperature in the water which must be moderate—neither too high nor too low. Grayling

are never found in streams that run from glaciers—at least near their source; and they are killed by cold or heat. I once put some grayling from the Teme, in September, with some trout, into a confined water, rising from a spring in the yard at Downton; the grayling all died, but the trout lived. And in the hot summer of 1825, great numbers of large grayling died in the Avon, below Ringwood, without doubt killed by the heat in July.

POIET.—But I have heard of grayling being common in Lapland—at least so says Linnæus.

HAL.—I think it must be another species of the same genus, the same as Back's grayling found by Captain Franklin and his companions in North America, and distinguished by a much larger back fin. Having travelled with the fishing-rod in my hand through most of the Alpine valleys in the south and east of Europe, and some of those in Norway and Sweden, I have always found the charr in the coldest and highest waters; the trout, in the brooks rising in the highest and coldest mountains; and the grayling always lower, where the temperature was milder; and if in hot countries, only at the foot of mountains, not far from sources which had the mean temperature of the atmosphere,—as in the Vipacco, near Goritzia, and in the streams which gush forth from the limestone caverns of the Noric Alps. Besides temperature

grayling require a peculiar character in the disposition of the water of rivers. They do not dwell, like trout, in rapid shallow torrents; nor, like charr or chub, in deep pools or lakes. They require a combination of stream and pool; they like a deep still pool for rest, and a rapid stream above, and a gradually declining shallow below, and a bottom where marl or loam is mixed with gravel; and they are not found abundant except in rivers that have these characters. It is impossible to have a more perfect specimen of a grayling river than that now running before us, in this part of its course. You see a succession of deep still pools under shady banks of marl, with gentle rapids above, and a long shelving tail, where the fish sport and feed. Should there be no such pools in a river, grayling would remain, provided the water was clear, and would breed; but they cannot stem rapid streams, and they are gradually carried down lower and lower, and at last disappear. You know the Test, one of the finest trout streams in Hampshire, and of course in England; when I first knew this stream, twenty years ago, there were no grayling in it. A gentleman brought some from the Avon, and introduced them into the river at Longstock, above Stockbridge. They were for two or three years very abundant in that part of the river; but they gradually descended, and though they multiplied greatly, there are now

scarcely any above Stockbridge. There were, four years ago, many in the river just below; but this year there are very few there, and the great proportion that remains is found below Houghton. I ought to mention, that the water is particularly fitted for them, and they become larger in this river than in their native place, the Avon,—some of them weighing between 3 and 4 lbs. The trout, in all its habits of migration, runs upward, seeking the fresh and cool waters of mountain-sources to spawn in: the grayling, I believe, has never the same habit of running up stream; I never saw one leaping at a fall, where trout are so often seen. Their large back fin seems intended to enable them to rise and sink rapidly in deep pools; and the slender nature of the body, towards the tail, renders them much more unfit for leaping cataracts than trout and salmon. The temperature of the water, and its character as to still and rapid, seem of more importance than clearness; for I have seen grayling taken in streams, that are almost constantly turbid,—as in the Inn and the Salza in the Tyrol. This fish appears to require food of a particular kind, feeding much upon flies and their larvæ, and not usually preying upon small fish, as the trout. It has a very strong stomach, in texture like that of the gillaroo trout, and is exceedingly fond of those larvæ which inhabit cases,

and are usually covered with sand or gravel. I once caught a grayling in the Wochain Save, that weighed about a pound and a half, the stomach of which equalled in size a very large walnut, and contained some small shells, and two or three white round pebbles as large as small beans. In accordance with their general habits of feeding, grasshoppers are amongst their usual food in the end of summer and autumn; and at all seasons, maggots, upon fine tackle and a small hook, offer a secure mode of taking them, —the pool having been previously baited for the purpose of angling, by throwing in a handful or two a few minutes before.

POIET.—You just now said, that you thought the Lapland fish, considered by Linnæus as grayling, was the same as Back's grayling; but I find, in the Appendix to Captain Franklin's narration, two graylings described as belonging to the northern regions, —one the Coregonus Signifer, and another, which appears to differ very little from it, except being small in size. This seems to agree as nearly as possible with our grayling, with a difference of at most one spine in the back fin. May not this in fact be the same fish as the grayling of the Alps, only rendered in a succession of generations fit for a colder climate?

HAL.—This is certainly possible; there is no doubt that, in many successive generations, animals may

be fitted to bear changes, which would have destroyed their progenitors. It is said by Bloch, that graylings are found in the Caspian sea, and in the Baltic,—masses of saline water; though, as I have proved, the grayling of England will not bear even a brackish water without dying. And notwithstanding the severity of the winter in high northern latitudes, streams under the ice may retain a temperature not much lower than some of the Alpine rivers. I have seen grayling in Carniola, in a source at the hottest season, not quite 50°; and as, in large bodies of water, the deepest part, in frost, is generally the warmest, about 40°, the degree at which water is heaviest, I see no reason why grayling may not be habituated to such a temperature — coolness being generally favourable to their existence. But see, the fog which had filled the valley and hid the mountains from our sight is clearing away, and I fear it will be a hot day. Before the sun becomes too bright is the best time for fishing, in such a day as this. As soon as the fog is fairly off, the water-flies will begin to appear, and fish to sport.

PHYS.—I see the fog has already disappeared from the deep water in the meadow, where, I suppose, the warmth of the air, from the considerable mass of the water, is greater; and which is further removed from the hills sending down currents of cold air, from the

mixture of which with the moist warm air above the river this phenomenon is produced. I see some yellow flies beginning to come out; they have already felt the influence of the warm air; and look, a fish has just risen opposite that bank, and he rises again; let us prepare our tackle.

POIET.—What flies shall we employ?

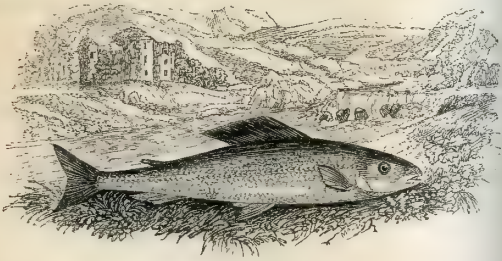
HAL.—I recommend at least three; for the grayling lies deeper and is not so shy a fish as the trout; and, provided your link is fine, is not apt to be scared by the cast of flies on the water. The fineness of the link, and of the guts to which your flies are attached, is a most essential point, and the clearer the stream the finer should be the tackle. I have known good fishermen foiled by using a gut of ordinary thickness, though their fly was of the right size and colour. Very slender transparent gut of the colour of the water is one of the most important causes of success in grayling fishing. Let me see your book: I will select a fine stretcher. Now, for the lowest fly, use a yellow-bodied fly, with red hackle for legs, and land-rail's wing; for the second, a blue dun, with dun body; and for the highest, the claret coloured body, with blue wings; and let your first dropper fly be about three feet from the stretcher and from the other dropper, and let the hanging link which attaches them be $3\frac{1}{2}$ inches long.

PHYS.—There are several fish rising: I shall throw at that opposite—he appears large.

HAL.—It is a trout and not a grayling.

PHYS.—How do you know?

HAL.—By his mode of rising. He is lying at the top of the water, taking the flies as they sail down by him, which a grayling scarcely ever does. *He* rises rapidly from the bottom or middle of the water, on the contrary—darting upwards, and, having seized his fly, returns to his station. There! a grayling has risen. I do not mean, however, that this habit is invariable; I have sometimes seen trout feed like grayling, and grayling like trout, but neither of these fish emits bubbles of air in rising, as dace and chub do.



Grayling.

PHYS.—I have one! He has taken my blue dun, and must be a small one, for he plays with no vigour.

HAL.—He is about ¾ lb.—a fish of two years and

a half old—very good for the table. I will land him if possible.

PHYS.—There! He is off!

HAL.—This happens often with grayling: their mouths are tender, and unless the hook catches in the upper lip, which is rather thick, it is more than an equal chance that the fish escapes you.

PHYS.—Here, I have another, that has taken the stretcher, and as it is a larger hook, I hope he may be held. He is likewise a larger fish—but how oddly he spins! This, I suppose, must be owing to his large back fin, by which the stream carries him round. There he is: he has quite twisted my link; it would not be amiss to have swivels for this kind of fishing.

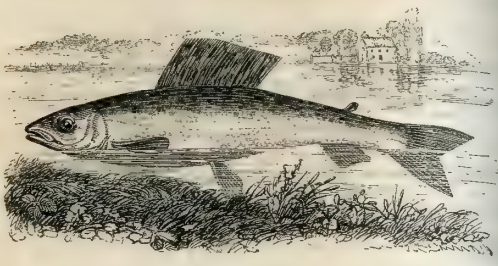
HAL.—It is a fish in good season,—dark above, fair below, and weighs, I should suppose, about 1¼lb.

PHYS.—As this is the first grayling I have seen of my own taking, I must measure, weigh, and examine him.

HAL.—We can do this hereafter. See, our fish barrel; he can be kept alive till a more convenient time of the day.

PHYS.—I am disposed to gratify my curiosity immediately; for to acquire information is at least as interesting to me as catching fish. I shall kill him by a blow on the head. He is not, I suppose, worth crimping afterwards?

HAL.—Certainly not, at this time; and it is not necessary with a fish of this size, which ought to be



Grayling.

fried; but if we catch a large grayling, approaching to 2lbs., he shall be killed, crimped, and boiled, like our Denham trout; you will then find him excellent, and not inferior, in my opinion, to the best perch—more like the most exquisitely tasted of all our fish, the red mullet.

PHYS.—Out of the water, this is a handsome fish, broader round the middle, and more hog-backed than the trout, but gracefully tapering towards the tail. The belly, I see, is silvery with yellow; and the pectoral, ventral, and anal fins are almost gold-coloured; the back gray with small black spots, and the back fin of a beautiful bright purple, with black and blue spots. It has likewise an agreeable odour; so that both from its colour and smell it does not seem undeserving the title given it by St. Ambrose, of

the flower of fishes. It measures, I find, 14 inches in length; in girth 7½. It weighs 17 ounces. It has 10 spines in the pectoral fin, 23 in the dorsal, 16 in the ventral, 14 in the anal, and 18 in the caudal.*

HAL.—Now for its anatomy. Its stomach is very thick, not unlike that of a charr or gillaroo trout, and contains flies, gravel, and larvæ, with their cases. The liver and bowels do not differ much from those of a trout; and the ovaria or roe, with eggs as large as mustard seed, are on each side the air bladder. Though a thicker fish, the grayling does not weigh much more than the trout in proportion to his length: the greater breadth of back is compensated by the more rapid tapering of tail, and a trout in very high season will sometimes equal in weight a grayling of the same length. The ova in this fish, and in the species generally, are very small at this time of the year; but in the beginning of April, the season of their spawning, they become nearly as large as the ova of the trout—of the size of peppercorns. But I see, Poietes, your rod is in order, and there are many fish rising in this deep pool, some of which are large grayling. The blue dun is on in quantity, and we

[* Its eye is marked by an angular pupil, pointed anteriorly; its mouth by its small and few teeth, situated in the lips and vomer; its odour, commonly faint and indistinct, by some is thought to resemble that of thyme.—J. D.]

have both cloud and wind, which half an hour ago we had no right to expect. Let me advise you to use three flies of different shades of the dun; the stretcher, a pale blue with yellow body; the first dropper, a winged fly with dun body; and the third, a similar fly with dark body. There, you see; he rose and refused your stretcher—and again he has a second time refused it. I think the colour of the dubbing is too bright: try a winged fly for the stretcher with a greenish body. Good—he has taken it, and ought to be a large fish. Now we have him: he is at least sixteen inches long, and in good season. Ornither, I advise you to use the same kind of fly, and to put up your tackle precisely in the same way as Poietes has done.

POIET.—How well they rise! At that moment I had two on my line: one of them is gone, but I hope I shall land the other.

HAL.—Fish with activity while the cloud lasts. I fear the sun is coming out, when it will be more difficult to take fish. I shall try the next pool, and I advise you to follow me and fish by turns,—passing each other, and taking different pools below, and so wend your way downwards, fishing wherever you see fish sporting. There is no better part of the river than that pool below you, and you cannot take a wrong direction. Immediately beyond Burrington Bridge

you will find two excellent pools, and I advise you to go no farther down to-day. If you take a fish approaching 2 lbs., keep him alive in the fish barrel for crimping; the smaller fish you can kill, and carry with some rushes in your basket; we shall at least be able to send a dish of grayling to the patron of our sport at Downton.

NOON.

HAL.—Well, gentlemen, I hope you have been successful.

POIET.—We have had good sport; but I have been for some time reposing on this bank, and admiring the scene below. How fine are these woods! How beautiful these banks! the hills in the distance approach to the character of mountains; and the precipitous cliff, which forms the summit of that distant elevation, looks like a diluvian monument, and as if it had been bared and torn by a deluge, which it had stemmed.

HAL.—It is one of the Clee hills, and its termination is basaltic, and such rocks usually assume such forms. But though this spot is beautiful, to-morrow I hope to show you a more exquisite landscape,—cliffs and woods, and gushing waters, of a character still more romantic. We will return to our inn by a

shorter road; but tell me, have you caught a large fish amongst you, and preserved him for crimping?

POIET.—We have preserved two fishes in the barrel, but I fear they are much below your proposed size.

HAL.—They are good fish, and of the average size of the large grayling in this stream—16 inches long, and about 1½ lb.; they will make a good variety boiled and placed in the middle of the fried fish. And how many have you caught altogether?

POIET.—I have basketed (to coin a word) three trout and six grayling.

PHYS.—And I have taken seven grayling. I caught trout likewise, but, not considering them in proper season, I returned them to the river: but Ornither has been the most successful; he has killed ten grayling.

HAL.—The trout is rarely good in this river—at least I never saw one that cut red, and yet I have taken them in July, when their external appearance was perfect and beautiful; but they have, to my taste, always a flabby and soft character of flesh, and at all seasons here are inferior for the table to grayling; yet they often attain a considerable size. There are few small fish in these streams, and I suppose the grayling, which are most numerous, deprive the trout of their proper share of the food, depending upon larvæ and flies.

PHYS.—As we are walking through these meadows, pray give us some information as to the habits of the grayling, and its localities in England: I have been so much pleased with my sport, that I shall become, with St. Ambrose, a patron of the fish.

HAL.—The habits of the grayling, like those of most other fish, are very simple. He is, I believe, to a certain extent, gregarious—more so than the trout, and less so than the perch, and the usual varieties of the carp species known in England. His form and appearance you have seen. He is as yet scarcely in his highest or most perfect season, which is in the end of November or beginning of December, when his back is very dark, almost black, and his belly and lower fins are nearly gold-coloured; but his brightness, like that of most other fishes, depends a good deal upon the nature of the water; and on the continent I have seen fishes far more brilliantly coloured than in England—the lower part almost a bright orange, and the back fin approaching to the colour of the damask rose, or rather of an anemone. The grayling spawns in April, and sometimes as late as the beginning of May: the female is generally then followed by two or three males. She deposits her ova in the tails of sharp streams, and the males, rubbing against her, shed upon the ova the milt or spermatic fluid. I do not know how long a time is required for the exclusion

of the young ones; but in the end of July, or beginning of August, they are of the size of sprats, four or five inches long, and already sport merrily at a fly. Though I have often taken grayling in bad season, yet I have rarely observed upon them the same kind of leech,* or louse, which is so often found upon the trout; from which I infer, that they seldom hide themselves, or become torpid in the mud. The grayling hatched in May or June, I conclude, become the same year, in September or October, nine or ten inches long, and weigh from *five ounces* to *half a pound;* and the year after they are from twelve to fifteen inches long, and weigh from three-quarters to a pound; and these two sizes, as you have seen, are the fish that most usually rise at the fly. The first size in this river is called *shote,* which is a Celtic word, I believe applied likewise in the west of England

* I may mention one remarkable instance as an exception, which has recently occurred to me, the 21st of May, 1828. I was fishing in the Save, between Wochain and Veldes, in some deep, clear, bright, green pools. I caught five or six grayling between 15 and 17 inches long, that had all leeches near the tail; they were beautifully coloured, and had probably got these parasitic animals after their spawning, when they reposed. Of course this was the time when they were in their worst season, as they were just beginning to recover from the work of generation. At this time they often rose at and refused the fly, but there were as yet no large flies on the water. The leech was a small greenish dark worm, about an inch or an inch and a half long, like a common leech in form and colour.

to small trout.* Of their growth after the second year I cannot speak; this must depend much on their food and place of residence. Marsigli says, they do not grow after the third year, and at this age, in Austria, they are sometimes a cubit long; but though I have fished much in that country, I never saw any so long. If they are taken into new and comparatively still water recently made, and where food is plenty, they grow very fast; under these circumstances, I have seen them above 3lbs. In the Test, where, as I mentioned before, the grayling has been only recently introduced, they have sometimes been caught between 3 and 4lbs.—in this river I never took one above 2lbs., but I have heard of one being taken of 2½lbs. The grayling is a rare fish in England, and has never been found in Scotland and Ireland (as Poietes observed before); and there are few rivers containing all the conditions necessary for their increase. I know of no grayling river farther west than the Avon in Hampshire: they are found in some of the tributary streams of this river which rise

[* Some of the circumstances stated in the text above admit of doubt,—as that of the contact of the male and female fish in the act of spawning; that of the young grayling, the *shote*, met with in September and October, being only four or five months old: from such information as I have been able to collect, I am led to infer, that like the salmon, the breeding fishes merely follow each other closely; and that the shote is at least one year old.—J.D.]

in Wiltshire. I know of no river containing them on the north coast west of the Severn: there are very few only in the upper part of this river, and in the streams which form it in North Wales. There are a few in the Wye and its tributary streams. In the Lug, which flows through the next valley, in Herefordshire, many grayling are found. In the Dee, as I have said before, they are found, but are not common. In Derbyshire and Staffordshire, the Dove, the Wye, the Trent, and the Blithe, afford grayling; in Yorkshire, on the north coast, some of the tributary streams of the Ribble,—and in the south, the Ure, the Wharfe, the Humber, the Derwent, and the streams that form it, particularly the Rye. There may be some other localities of this fish unknown to me; but as I have fished much, and inquired much respecting the places where it is found, I think my information tolerably correct and complete.

PHYS.—Is this fish to be fished for in spring?

HAL.—He is to be fished for at all times, for he is rarely so much out of season as to be a bad fish; and when there are flies on the water, he will generally take them: but as the trout may be considered as a spring and summer fish, so the grayling may be considered as a winter and autumnal fish.

PHYS.—Of course the grayling is taken in spring with the same imitation of flies as the trout?

HAL.—The same. As far as flies are concerned, these two species feed alike; though I may say, generally, that the grayling prefers smaller flies, and the varieties of the ephemeræ or phryganeæ, of the smallest size, form their favourite food. Yet grayling do not refuse large flies; and in the Avon and Test, May flies, and even moths, are greedily taken in the summer by large grayling. Flies, likewise, that do not inhabit the water, but are blown from the land, are good baits for grayling. There is no method more killing, for large grayling, than applying a grasshopper to the point of a leaded hook, the lead and shank of which are covered with green and yellow silk, to imitate the body of the animal. This mode of fishing is called sinking and drawing. I have seen it practised in this river with as much success as maggot fishing; and the fish taken were all of the largest size; the method being most successful in deep holes, where the bottom was not visible, which are the natural haunts of such fish. In the winter, grayling rise for an hour or two, in bright and tolerably warm weather; and, at this time, the smallest imitations of black or pale gnats that can be made, on the smallest sized hook, succeed best in taking them. In March, the dark-bodied willow fly may be regarded as the earliest fly; the imitation of which is made by a dark claret dubbing and a dun hackle, or four small

starling's wing feathers. The blue dun comes on in the middle of the day in this month, and is imitated by dun hackles for wings and legs, and an olive dubbing for body. In mild weather, in morning and evening in this month, and through April, the green tail, or grannom, comes on in great quantities, and is well imitated by a hen pheasant's wing feather, a gray or red hackle for legs, and a dark peacock's harle, or dark hare's ear fur, for the body. The same kind of fly, of a larger size, with paler wings, kills well in the evening, through May or June. The imitation of a water insect called the spider fly, with a lead coloured body and woodcock's wings, is said to be a killing bait, on this and other rivers, in the end of April and beginning of May; but I never happened to see it on the water. The dark alder fly, in May and June, is taken greedily by the fish: it is imitated by a dark-shaded pheasant's wing, black hackle for legs, and a peacock's harle, ribbed with red silk, for the body. At this season, and in July, imitations of the black and red palmer worms, which I believe are taken for black or brown, or red beetles or cockchaffers, kill well; and, in dark weather, there are usually very light duns on the water. In August, imitations of the house fly and blue bottle, and the red and black ant fly, are taken, and are particularly killing after floods in autumn, when great quantities of the fly are

destroyed and washed down the river. In this month, in cloudy days, pale-blue duns often appear; and they are still more common in September. Throughout the summer and autumn, in fine calm evenings, a large dun fly, with a pale yellow body, is greedily taken by grayling after sunset; and the imitation of it is very killing. In the end of October, and through November, there is no fly fishing but in the middle of the day, when imitations of the smaller duns may be used with great success; and I have often seen the fish sport most, and fly fishing pursued with the greatest success, in bright sunshine, from twelve till half-past two o'clock, after severe frosts in the morning; and I once caught, under these circumstances, a very fine dish of fish on the 7th of November. It was in the year 1816; the summer and autumn had been peculiarly cold and wet, and, probably in consequence of this, the flies were in smaller quantity at their usual season, and there was a greater proportion later in the year. Grayling, if you take your station by the side of a river, will rise nearer to you than trout, for they lie deeper, and therefore are not so much scared by an object on the bank; but they are more delicate in the choice of their flies than trout, and will much oftener rise and refuse the fly. Trout, from lying nearer the surface, are generally taken before grayling, where the

water is slightly coloured, or after a flood: and in rain, trout usually rise better than grayling, though it sometimes happens, when great quantities of flies come out in rain, grayling, as well as trout, are taken with more certainty than at any other time;—the artificial fly, in such cases, looks like a wet fly, and allures even the grayling, which generally is more difficult to deceive than trout in the same river.

PHYS.—As I was looking into a ditch coming down the river, which is connected with it, I saw a very large eel at the bottom, that appeared to me to be feeding on a small grayling:—are there many of this fish in the Teme, and do they breed here?

HAL.—There are many of this fish in the river; but to your question, do they breed here? I must answer in the negative. The problem of their generation is the most abstruse, and one of the most curious, in natural history; and though it occupied the attention of Aristotle, and has been taken up by most distinguished naturalists since his time, it is still unsolved.

PHYS.—I thought there was no doubt on the subject. Lacepède, whose book is the only scientific one on fishes I have read with attention, asserts, in the most unqualified way, that they are viviparous.

HAL.—I remember his assertion, but I looked in vain for proofs.

PHYS.—I do not remember any *facts* brought

forward on the subject; but tell us what you think upon it.

HAL.—I will tell you all I know, which is not much. This is certain, that there are two migrations of eels,—one up and one down rivers, one *from* and the other *to* the sea; the first in spring and summer, the second in autumn or early winter. The first, of very small eels, which are sometimes not more than two or two and a half inches long; the second, of large eels, which sometimes are three or four feet long, and weigh from 10 to 15, or even 20lbs. There is great reason to believe, that all eels found in fresh water are the results of the first migration; they appear in millions in April and May, and sometimes continue to rise as late even as July and the beginning of August. I remember this was the case in Ireland, in 1823. It had been a cold backward summer, and when I was at Ballyshannon, about the end of July, the mouth of the river, which had been in flood all this month, under the fall, was blackened by millions of little eels, about as long as the finger, which were constantly urging their way up the moist rocks by the side of the fall. Thousands died, but their bodies remaining moist, served as the ladder for others to make their way; and I saw some ascending even perpendicular stones, making their road through wet moss, or adhering to some eels, that had died in the attempt.

Such is the energy of these little animals, that they continue to find their way, in immense numbers, to Loch Erne. The same thing happens at the Fall of the Bann, and Loch Neagh is thus peopled by them; even the mighty Fall of Schaffhausen does not prevent them from making their way to the Lake of Constance, where I have seen many very large eels.

PHYS.—You have shown, that some eels come from the sea, but I do not think the facts prove, that all eels are derived from that source.

HAL.—Pardon me—I have not concluded. There are eels in the Lake of Bourget, which communicates by a stream with the Rhine; but there are none in the Leman Lake, because the Rhone makes a subterraneous fall below Geneva; and though small eels can pass by moss, or mount rocks, they cannot penetrate limestone, or move against a rapid descending current of water, passing, as it were, through a pipe. Again; no eels mount the Danube from the Black Sea; and there are none found in the great extent of lakes, swamps, and rivers communicating with the Danube,—though some of these lakes and morasses are wonderfully fitted for them, and though they are found abundantly in the same countries, in lakes and rivers connected with the ocean and the Mediterranean. Yet, when brought into confined water in the Danube, they

fatten and thrive there. As to the instinct, which leads young eels to seek fresh water, it is difficult to reason:—probably they prefer warmth; and, swimming at the surface in the early summer, find the lighter water warmer, and likewise containing more insects, and so pursue the courses of fresh water, as the waters from the land, at this season, become warmer than those of the sea. Mr. J. Couch (Lin. Trans. t. xiv. p. 70) says, that the little eels, according to his observation, are produced within reach of the tide, and climb round falls to reach fresh water from the sea. I have sometimes seen them, in spring, swimming in immense shoals in the Atlantic, in Mount's Bay, making their way to the mouths of small brooks and rivers. When the cold water from the autumnal floods begins to swell the rivers, this fish tries to return to the sea; but numbers of the smaller ones hide themselves during the winter in the mud, and many of them form, as it were, masses together. Various authors have recorded the migration of eels in a singular way,—such as Dr. Plot, who, in his History of Staffordshire, says, that they pass in the night, across meadows, from one pond to another; and Mr. Arderon (in Trans. Royal Soc.) gives a distinct account of small eels rising up the flood-gates and posts of the water-works of the city of Norwich; and they made their way to the water above, though the boards were smooth planed,

and five or six feet perpendicular. He says, when they first rose out of the water upon the dry board, they rested a little—which seemed to be till their slime was thrown out, and sufficiently glutinous,—and then they rose up the perpendicular ascent with the same facility as if they had been moving on a plane surface.—(Trans. Abr. vol. ix. p. 311.) There can, I think, be no doubt, that they are assisted by their small scales, which, placed like those of serpents, must facilitate their progressive motion:* these scales have been microscopically observed by Leuenhoeck. —(Phil. Trans. vol. iv.) Eels migrate from the salt water of different sizes, but I believe never when they are above a foot long—and the great mass of them are only from two and a half to four inches. They feed, grow, and fatten in fresh water. In small rivers they are seldom very large; but in large deep lakes they become as thick as a man's arm, or even leg; and all those of a considerable size attempt to return to the sea in October or November, probably when they experience the cold of the first autumnal rains. Those that are not of the largest size, as I said before, pass the winter in the deepest parts of the mud of rivers and lakes, and do not seem to eat much, and remain, I believe, almost torpid.

* [Relative to this opinion, and the following one, that the conger and eel are not distinct species, see additional note at the end of the volume.—J. D.]

Their increase is not certainly known in any given time; it must depend upon the quantity of their food; but it is probable they do not become of the largest size, from the smallest, in one or even two seasons; but this, as well as many other particulars, can only be ascertained by new observations and experiments. Bloch states, that they grow slowly, and mentions, that some had been kept in the same pond for fifteen years. As very large eels, after having migrated, never return to the river again, they must (for it cannot be supposed that they all die immediately in the sea) remain in salt water; and there is great probability, that they are then confounded with the conger, which is found of different colours and sizes—from the smallest to the largest—from a few ounces to one hundred pounds in weight. The colour of the conger is generally paler than that of the eel; but, in the Atlantic, it is said, that pale congers are found on one side of the Wolf Rock, and dark ones on the other. The conger has breathing tubes, which are said not to be found in the other eel: but to determine this would require a more minute examination than has yet been made. Both the conger and common eel have fringes along the air bladder, which are probably the ovaria; and Sir E. Home thinks them hermaphrodite, and that the reproductive vessels are close to the kidneys.* I hope this great

* [The best and latest researches have proved that this opinion of Sir

comparative anatomist will be able to confirm his views by new dissections, and some chemical researches upon the nature of the fringes and the supposed milt. If viviparous, and the fringes contain the ova, one mother must produce tens of thousands, the ova being remarkably small; but it appears more probable, that they are oviparous, and that they deposit their ova in parts of the sea near deep basins, which remain warm in winter. This might be ascertained by experiment, particularly on the coasts of the Mediterranean. I cannot find, that they haunt the Arctic ocean, which is probably of too low a temperature to suit their feelings or habits; and the Caspian and the Black Sea are probably without them, from their not being found in the Volga or Danube; these, being shallow seas, are perhaps too cold for them in winter. From the time (April) that small eels begin to migrate, it is probable that they are generated in winter; and the pregnant eels ought to be looked for in November, December, and January. I opened one in December, in which the fringes were abundant, but I did not examine them under the microscope, or chemically: I trust this curious problem will not remain much longer unsolved.

E. Home is unfounded, and that that which the author considered as most probably correct is true,—viz. that the sexes are distinct.—Sir E. Home was led into error by the similarity of the ovaries and testes in their form and structure as seen by the naked eye.—J. D.]

Downton Castle on the Teme; from a sketch by Mrs. Stackhouse Acton.

EIGHTH DAY.

HALIEUS—POIETES—ORNITHER—PHYSICUS.

SCENE—*Downton.*

POIET.—This is a beautiful day, and, I think, for fishing, as well as for the enjoyment of the scenery, finer than yesterday. The wind blows from the south, and is balmy; and though a few clouds are collecting, they are not sufficiently dense to exclude

the warmth of the sun; and, as lovers of the angle, we ought to prefer his warmth to his light.

HAL.—I do not think, as the day advances, there will be any deficiency of light; and I shall not be sorry for this, as it will enable you to see the grounds of Downton, and the distances in the landscape, to more advantage: nor will light interfere much with our sport in this valley, where, as you see, there is no want of shade.

POIET.—This spot is really very fine. The fall of water, the picturesque mill, the abrupt cliff, and the bank, covered with noble oaks, above the river, compose a scene such as I have rarely beheld in this island.

HAL.—We will wander a little longer through the walks. There you will enter a subterraneous passage in the rock beyond the mossy grotto. Behold, the castle, or mansion-house, clothed in beautiful vegetables, of which the red creeper is most distinct, rises above on the hill! After we have finished our walk and our fishing, I will, if you please, take you to the house, and introduce you to its worthy master, whom to know is to love, to whom all good anglers should be grateful, and who has a strong claim to a more extensive gratitude—that of his country and of society—by his scientific researches on vegetable nature, which are not merely curious, but useful, and

which have already led to great improvements in our fruits and plants, and have generally extended the popularity of horticulture.

PHYS.—We shall be much obliged to you for the favour—provided always that you know it will not be an intrusion.

HAL.—Trust this to me. And now, as all circumstances are favourable, begin your fishing. I recommend to you that fine pool below the bridge; there are always grayling to be caught there—and already I see some rising.

PHYS.—With what imitation of flies shall we fish?

HAL.—As yesterday; a yellow fly for your stretcher, and two duns for the droppers. There, you have a good fish. And now another—both grayling.

PHYS.—I shall try the rapid at the top of this long large pool; I see several fish rising there.

HAL.—Do so. You will catch fish there—trout, but I fear no grayling.

PHYS.—Why not?

HAL.—In that part of the stream the water is too rough for grayling, and they like to be nearer the deep water. Lower down, in the same pool, there are large grayling to be caught.

PHYS.—You are in the right; the fish I have is a

large trout—at least he is not much less than 2lbs. I have landed him; shall I keep him?

HAL.—As you please: he is as good as he ever was, or ever will be in this water.

PHYS.—There are now more yellow flies out than I have seen before this season. They have appeared suddenly, as if sprung from that large alder. Though you gave us in a former conversation some account of the flies used in fishing, yet I hope you have not forgot your promise, to favour us with some more details on this subject, which, both as connected with angling, and with a curious part of natural history, is very interesting.

HAL.—I wish it was in my power to give you information from my own experience, but, I am sorry to say, this has been very limited; and though the English are peculiarly the fly fishing nation, yet our philosophical anglers have not contributed much to this department of science, and what has been done is principally by foreigners, amongst whom Swammerdam, Reaumur, and above all De Geer, are pre-eminent. To attempt to collect and apply the knowledge accumulated by these celebrated men, would carry us far beyond the limits of a day's conversation; and as a great proportion of the insects that fly, walk, or crawl, are the food of fishes, a dissertation, or discourse on this subject, would be

almost a general view of natural history. You know that frogs, crawfish, snails, earthworms, spiders, larvæ of every kind, millipedes, beetles, squillæ, moths, water flies, and land flies, are all eaten by trout; and I once heard the late Sir Joseph Banks say, that he found a large toad stuck in the throat of a trout; but as the skin of this animal is furnished with an exceedingly acrid secretion, it probably had been disgorged after being swallowed by a fish exceedingly hungry.* But though I have found most of the insect tribes, and many small fishes even of the most ravenous kind, as pike, in the stomachs of trout, it never happened to me to see a toad there. I might give you an account of the birth and life of frogs, which, with respect to their generation, resemble fish, and which, when first excluded from the egg, may be considered in the tadpole state as fish; and you would not find their singular metamorphosis without interest. Or I could detail to you the true histories which naturalists have given

* [Or, perhaps, by a fish of a breed that had no experience of the poisonous qualities of the toad;—not an improbable circumstance, considering that the toad is rarely found, and never except by accident, in the clear brisk streams, the favourite haunts of the trout. When the toad was first introduced into Barbados, only about twenty years ago, dogs, to their cost, made them their prey, some dying it is said, and some becoming mad from the effects of the poison; now taught by experience, they as carefully avoid them there, as they do in this country.—J.D.]

of the habits of snails and earthworms, and of the sexual relations of these apparently contemptible animals;—but this is too delicate a subject to dwell on. Even the renewing or change of shell in the crawfish, when it falls in its soft state an easy prey to fish, is a curious inquiry not only for the physiologist, but likewise for the chemist. On these points, I must request you to refer to writers on Natural History: yet I shall perform my promise, and say a few words on winged insects, which, in their origin and metamorphosis, offer the most extraordinary known miracles perhaps of terrestrial natures. You must be acquainted with the origin of our common house flies?

PHYS.—We know that they spring from maggots, and that both the common and blue bottle fly deposit their ova in putrid animal matter, where the eggs are hatched and produce maggots; that after feeding upon the decomposing animal material, they gradually change, gain a hard or horny coat, seem as if entombed, and wait in a kind of apparent death or slumber, till they are mature for a new birth, when they burst their coatings and appear in the character of novel beings—fitted to inhabit another element.

HAL.—The history of the birth and metamorphosis of all other winged insects is very similar, but with peculiarities dependent upon their organs, wants, and

habits. You know the curious details with which we have been furnished by natural historians of bees and ants, which live in a kind of society. The ant flies, of which, as I mentioned to you, imitations are sometimes used by fishermen, were originally maggots, and became furnished with wings—not, however, passing through the aurelia state for this last transformation.

POIET.—I beg your pardon, but, having lately read an account of these animals in the very interesting book, called "An Introduction to Entomology," I think I can correct you in one particular, which is, that the maggot of the ant *does* assume the form of a chrysalis or pupa, before it becomes a winged animal.

HAL.—It is true, that the *immediate* transition of the maggot is into a pupa, *then* into an ant, which is furnished with a kind of case, from which the wings emerge for their perfect transformation into the fly or imago state. The males die soon after performing the sexual function; the females, when impregnated, lose their wings, and either voluntarily or by force enter into society with neuter or working ants, for the purpose of raising a new generation.

POIET.—You are perfectly right; and, though it would be irrelevant to our present object, I could almost wish, for the sake of amusing our friends, that you would detail to us some other parts of the

marvellous history of these wonderful animals, which, if not so well authenticated, might be supposed a philosophical romance;—such as the neuter or working ants feeding each other and the offspring;—the manner in which they make, defend, and repair their dwellings, provide their food, watch and attend to the female, and take care of her eggs;—their extraordinary mode of acquiring and defending the aphides and cocci, which bear to them the same relation that cattle do to man, which are fed by them with so much care, and the milk of which forms so important a part of their food;—the predatory excursions of a particular species to carry off pupæ, which they bring up as slaves.

HAL.—To enter into any of the details of the history of insects in society, would carry us into an interminable, though interesting subject, that would soon lose all relation to fly-fishing: and I fear what I have to say, even on the winged insects connected with this amusement, will occupy too much of your time, for we have not more than an hour to devote to this object.

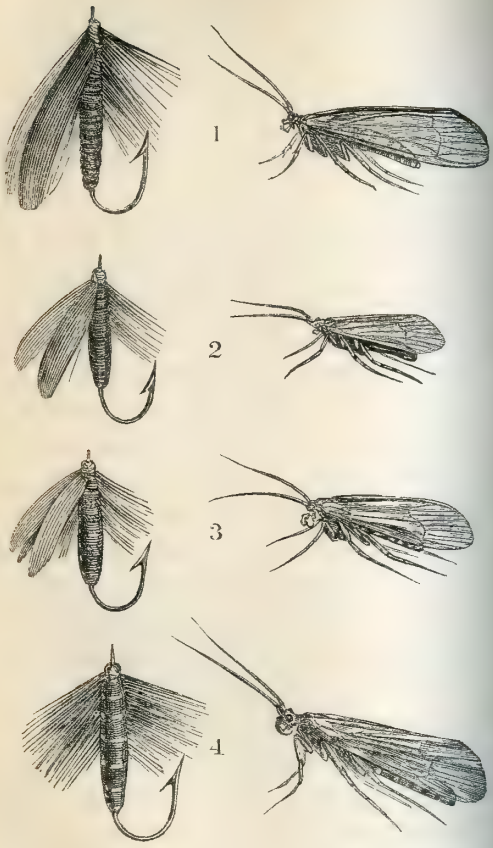
POIET.—Tell us what you please: we are attentive.

HAL.—The various individuals of the *gryllus*, or grasshopper tribe, spring from larvæ, that do not differ much from the perfect insect, except in possessing no wings. The eggs are deposited in our meadows,

and many species of this animal are gregarious, and their emigrations in swarms are well known. The butterfly and moths, as you know, lay eggs which produce caterpillars; and these caterpillars, after feeding upon vegetable food, spin themselves or frame houses or beds,—cocoons; in which they are transformed into aurelias, and from which they burst forth as perfect winged insects. The *libellula*, or dragon fly, the most voracious of the winged insect tribe, deposits her eggs in such a manner, that the larvæ fall into the water, and, after destroying and feeding upon almost all the aquatic insects found in this element, and changing their skins at various times, they emerge in their winged form the tyrants of the insect generations in the air. The gnats and tipulæ have a similar existence. The gnat,—the female of which only is said by De Geer to bite man, or suck human blood,—in Sweden, lays her egg in a kind of little boat or cocoon of her own spinning. These eggs are hatched on the surface of the water, and produce the larvæ, which undergo another change into peculiar nymphæ, that still retain the power of swimming and moving, from which the perfect insect is produced during the summer heat. The flies, which I mentioned to you in a former conversation, under the name of the grannom, or green tail, (*see fig.* 2,) are of the class *phryganeæ*, which includes all those

PHRYGANEÆ,

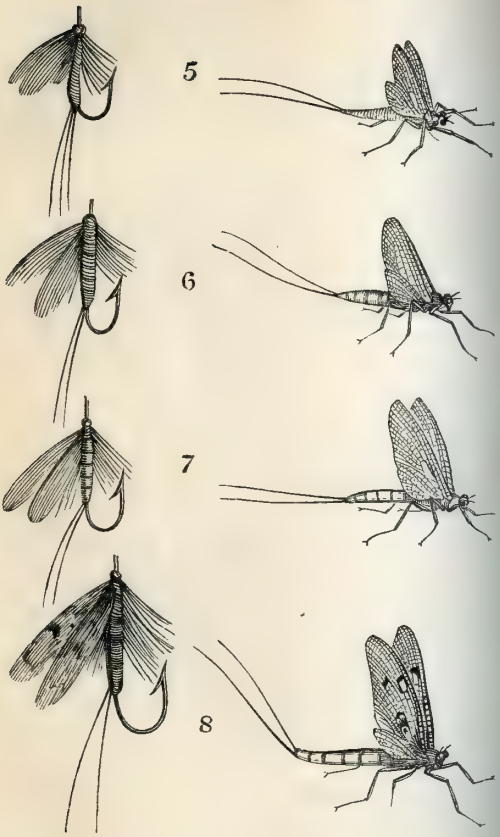
WITH THEIR IMITATIONS ON HOOKS.



water flies that have long antennæ, and wings something like those of the moths, but usually veined and without powder. The yellow flies, which you saw a short time since sporting on the banks of the river, are of this kind. The phryganeæ (*see figs.* 1, 2, 3, and 4,) have four wings, which, when closed, lie flat on their backs, the two upper ones being folded over the lower ones: the flies called by anglers the willow fly, the alder fly, (*see fig.* 4,) and the dun cut, are of this kind. The phryganeæ lay their eggs on the leaves of willows, or other trees, that overhang the water; they are fastened by a sort of gluten to the surface of the leaf: when hatched, they produce small hexapode larvæ, which fall into the water, and by a curious economy of nature collect round themselves—some, parts of plants or small sticks; some, gravel; and some, even shell fish. They spin themselves a sort of case of silk from their bodies, and by a gluten, that exudes from this case, cement their materials together. They feed upon aquatic plants, and sometimes upon insects, protruding only their head and legs from the case. When about to undergo transmutation, they quit their cases, rise to the surface, and wait for this process of nature in the air; but some species fix themselves on plants or stones: they burst the skin of the larvæ, and appear perfect animals, male and female, fitted for the office

EPHEMERÆ,

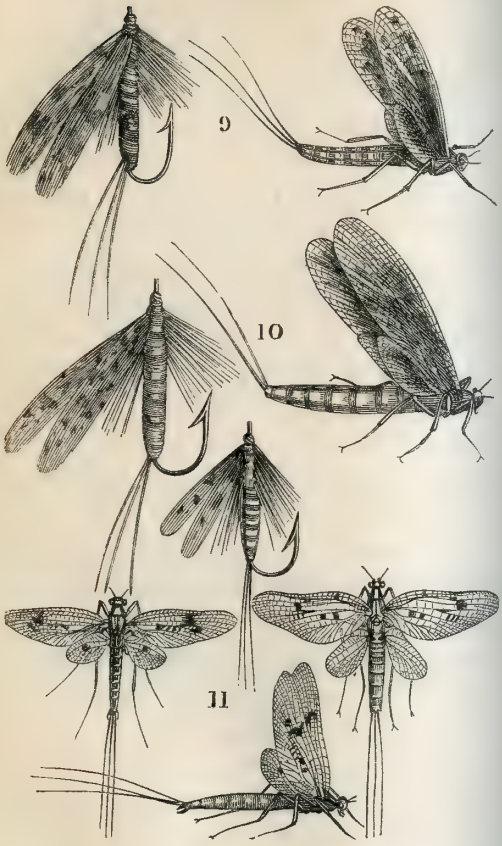
WITH THEIR IMITATIONS ON HOOKS.



of reproduction. In the early spring, the species which are called green tails, from the colour of the bags of eggs in the female, appear in the warm gleams of sunshine that happen in cloudy days, and they then cover the face of the water, and are greedily seized on by the fish. As the season advances they appear principally in the morning and evening. In the heat of summer the phryganeæ are almost nocturnal flies, and seem to have the habits of moths: at this season, *now*, I should say, the few flies that appear are generally seen in the day-time. The *ephemeræ*, another class of flies peculiarly interesting to the fisherman, differ from the phryganeæ in carrying their wings perpendicularly on their backs, and in having long filaments or hairs in their tails. The March brown (*see fig.* 8,) the various shades of duns, (*see figs.* 5, 6, and 7,) which I described to you on a former occasion; the green (*see figs.* 9 and 10,) and white May fly, the red spinner, (*see fig.* 11,) are all of the class ephemeræ. These flies are produced from larvæ which inhabit the water, which can both crawl and swim, and which generally live in holes they make in the bottom. They change their coats several times before they become nymphæ; they quit their skin on the surface of the water; but even after they are flies, they have another transformation to undergo before they are perfect

EPHEMERÆ,

WITH THEIR IMITATIONS ON HOOKS.



animals fitted for generation; they make use of their wings only to fly to some dry bank, or trunk of a tree, where they gradually disencumber themselves of the whole of the outward habiliment they brought from the water, including their wings; they become lighter, more beautiful in colour, and then begin their sports in the sunshine—appearing like what might be imagined of spirits freed from the weight of their terrestrial covering. This last transmutation has been observed and fully described by some celebrated naturalists, in the case of the May-flies, and one or two other species, and it probably will be found a general circumstance attached to the class; I have often observed what appeared to me to be the cast-off skins of the small species of ephemeræ on the banks of rivers and floating in the water. The green ephemera, or May-fly, lays her eggs sitting on the water, which instantly sink to the bottom; and most of the duns, or small slender-winged flies, do the same. The gray, or glossy-winged May-fly, commonly called the gray drake, performs regular motions in the air above water, rising and falling, and sitting, as it were, for a moment on the surface, and rising again, at which time she is said to deposit her eggs. To attempt to describe all the variety of ephemeræ, that sport on the surface of the water at different times of the day, throughout the

year, would be quite an endless labour. Some of them appear to live only a few hours, and none of them, I believe, have their existence protracted to more than a few days. In spring and autumn a new variety of these flies sometimes appears every day, or even in different parts of the same day. Of the beetle, or coleoptera genus, there are many varieties fed on by fishes. These insects, which are distinguished, as you know, by four wings, two husky-like shells above, and two slender and finer ones below, are bred from eggs, which they deposit in the ground, or in the excrement of animals, and which, producing larvæ in the usual way, are converted into beetles, and these larvæ themselves are good bait for fish. The brown beetle or cockchaffer, the fern-fly, and the gray beetle, which are abundant in the meadows in the summer, are often blown into the water, and are the most common insects of this kind eaten by fishes. Whether the ditisci and hydrophili, the water beetles, are ever eaten by trout, I know not, but it is most probable. These singular animals are most commonly found in stagnant waters; fitted for flying, swimming, diving, and walking; they are omnivorous, and usually fly from pool to pool in the evening. They deposit their eggs in the water, where their larvæ live, but which, to undergo transmutation into the beetle, migrate to the land. But there is hardly an

insect that flies, including the wasp, the hornet, the bee, and the butterfly, that does not become at some time the prey of fishes. I have not, however, the knowledge, or if I had, have not the time, to go through the lists of these interesting little animals: but of the family of one of them I must speak—the ichneumons, that deposit their eggs in caterpillars, or the larvæ of other flies, and which feed on the unfortunate animal in which they are hatched, and come out of its interior when dead, as if it had been their parent. To enter into the philosophy of this subject, and to study the organs and faculties of these various insect tribes, in their function of respiration, nutrition, and reproduction, would be sufficient for the labour of a life. To know what has already been done would demand the close and studious application of a comprehensive mind; and to complete this branch of science in all its parts is probably almost above human powers; but much might be done if enlightened persons would follow the example of De Geer, Reaumur, and Huber, and study minutely the habits of particular tribes; and it is probable, that physiology might be much advanced by minutely investigating the simplest forms of living beings, and that particularly with respect to the functions of generation; a minute study of the modifications of which the forms of animals seem susceptible, particu-

larly in the hymenopterous, or bee tribe, might lead to very important results.

POIET.—Even in a moral point of view, I think the analogies derived from the transformation of insects admit of some beautiful applications, that have not been neglected by pious entomologists. The three states of the caterpillar, pupa or aurelia, and butterfly, have, since the time of the Greek poets, been applied to typify the human being—its terrestrial form, apparent death, and ultimate celestial destination; and it seems more extraordinary that a sordid and crawling worm should become a beautiful and active fly—that an inhabitant of the dark and fetid dung-hill should in an instant entirely change its form, rise into the blue air, and enjoy the sunbeams,—than that a being, whose pursuits here have been after an undying name, and whose purest happiness has been derived from the acquisition of intellectual power and finite knowledge, should rise hereafter into a state of being, where immortality is no longer a name, and ascend to the source of Unbounded Power and Infinite Wisdom.

PHYS.—I have been listening, Halieus, to your account of water-flies with attention, and I only regret, that your details were not more copious. Let me now call your attention to that Michaelmas daisy; a few minutes ago, before the sun sunk behind the

hill, its flowers were covered with varieties of bees, and some wasps, all busy in feeding on its sweets. I never saw a more animated scene of insect enjoyment. The bees were most of them humble bees, some new to me, and the wasps appeared different from any I have seen before.

HAL.—I believe this is one of the last autumnal flowers that insects of this kind haunt. In sunny days it is their constant point of resort, and it would afford a good opportunity to the entomologist to make a collection of British bees.

POIET.—I neither hear the hum of the bee, nor can I see any on its flowers. They are now deserted.

PHYS.—Since the sun has disappeared, the cool of the evening has, I suppose, driven the little winged plunderers to their homes. But see, there are two or three humble bees which seem languid with the cold, and yet they have their tongues still in the fountain of honey; I believe one of them is actually dead, yet his mouth is still attached to the flower. He has fallen asleep, and probably died whilst making his last meal of ambrosia.

ORN.—What an enviable destiny, quitting life in the moment of enjoyment, following an instinct, the gratification of which has been always pleasurable! so beneficent are all the laws of Divine Wisdom.

PHYS.—Like Ornither, I consider the destiny of

this insect as desirable, and I cannot help regarding the end of human life as most happy, when terminated under the impulse of some strong energetic feeling, similar in its nature to an instinct. I should not wish to die like Attila in a moment of gross sensual enjoyment: but the death of Epaminondas or Nelson in the arms of victory, their whole attention absorbed in the love of glory and of their country, I think really enviable.

POIET.—I consider the death of the martyr or the saint as far more enviable; for in this case, what may be considered as a divine instinct of our nature, is called into exertion, and pain is subdued, or destroyed by a secure faith in the power and mercy of the Divinity. In such cases man rises above mortality, and shows his true intellectual superiority. By intellectual superiority I mean that of his spiritual nature, for I do not consider the results of reason as capable of being compared with those of faith. Reason is often a dead weight in life, destroying feeling, and substituting, for principle, calculation and caution; and, in the hour of death, it often produces fear or despondency, and is rather a bitter draught than nectar or ambrosia in the last meal of life.

HAL.—I agree with Poietes. The higher and more intense the feeling, under which death takes place

the happier it may be esteemed; and I think even Physicus will be of our opinion, when I recollect the conclusion of a conversation in Scotland. The immortal being never can quit life with so much pleasure as with the feeling of immortality secure, and the vision of celestial glory filling the mind, affected by no other passion than the pure and intense love of God.

Traun Fall.

NINTH DAY.

HALIEUS—POIETES—ORNITHER—PHYSICUS.

FISHING FOR HUCHO.

SCENE—*The Fall of the Traun, Upper Austria.*

TIME—*July.*

POIET.—This is a glorious scene! And the fall of this great and clear river, with its accompaniments of wood, rock, and snow-clad mountain, would alone

furnish matter for discussion and conversation for many days. This place is quite the paradise of a poetical angler; the only danger is that of satiety with regard to sport; for these great grayling and trout are so little used to the artificial fly, that they take almost any thing moving on the top of the water. You see I have put on a salmon fly, and still they rise at it, though they never can have seen any thing like it before—and it is, in fact, not like any thing in nature.

HAL.—You are right, they have never seen any thing like it before; but, in its motion, it is like a large fly, and this is the season for large flies. The stone fly and the May fly, you see, occasionally drop upon the water, and the colour of your large fly is not unlike that of the stone fly; but if, instead of being here in the beginning of July, you had visited this spot, as I once did, in the beginning of June, you would have found more difficulty in catching grayling here, though not so much as in our English rivers—in the Test, the Derwent, or the Dove.

POIET.—How could this be?

HAL.—At this season the large flies had not yet appeared; the small blue dun was on the water, and I was obliged to use a fly the same as that which suits our spring and late autumnal fishing. The fish refused all large flies, but took greedily small ones;

and, as usually happens when small flies are used, more fish escaped after being hooked than were taken; and these I found, the next day, were become as sagacious as our Dove or Test fish, and refused the artificial fly, though they greedily took the natural fly.

PHYS.—These fish, then, have the same habits as our English salmons and trouts?

HAL.—The principle to which I have referred in two former conversations must be general, though it has seemed to me, that they lost this memory sooner than the fish of our English rivers, where fly-fishing is common. This, however, may be fancy, yet I have referred it to a kind of hereditary disposition, which has been formed and transmitted from their progenitors.

PHYS.—However strange it may appear, I can believe this. When the early voyagers discovered new islands, the birds upon them were quite tame, and easily killed by sticks and stones, being fearless of man; but they soon learned to know their enemy, and this newly acquired sagacity was possessed by their offspring, who had never seen a man. Wild and domesticated ducks are, in fact, from the same original type: it is only necessary to compare them, when hatched together under a hen, to be convinced of the principle of the hereditary transmission of

habits,—the wild young ones instantly fly from man, the tame ones are indifferent to his presence.

POIET.—No one can be less disposed than I am to limit the powers of living nature, or to doubt the capabilities of organised structures; but it does appear to me quite a dream, to suppose that a fish, pricked by the hook of the artificial fly, should transmit a dread of it to its offspring, though he does not even long retain the memory of it himself.

HAL.—There are instances quite as extraordinary; —but I will not dwell upon them, as I am not quite sure of the fact which we are discussing; I have made a guess only, and we must observe more minutely to establish it; it may be even as you suppose—a mere dream.

POIET.—I shall go and look at the fall: I am really satiated with sport; this is the twentieth fish I have taken in an hour, and it is a grayling of at least seventeen inches long; and there is a trout of eighteen, and several salmon trout, which look as if they had run from the sea.

HAL.—These salmon trout have run from a sea, but not from a salt sea; they are fish of the Traun See, as it is called by the Germans, or Traun Lake, which is emptied by this river.

PHYS.—Tell us why they are so different from the

river trout, or why there should be two species or varieties in the same water.

HAL.—Your question is a difficult one, and it has already been referred to in a former conversation; but I shall repeat what I stated before,—that qualities occasioned by food, peculiarities of water, &c. are transmitted to the offspring, and produce varieties which retain their characters as long as they are exposed to the same circumstances, and only slowly lose them. Plenty of good food gives a silvery colour and round form to fish, and the offspring retain these characters. Feeding much on larvæ and on shell-fish thickens the stomach, and gives a brighter yellow to the belly and fins, which become hereditary characters. Even these smallest salmon trout have green backs, black spots *only*, and silvery bellies; from which it is evident, that they are the offspring of the lake trout, or *lachs forelle*, as it is called by the Germans; whilst the river trout, even when 4 or 5lbs., as we see in one of these fish, though in excellent season, have red spots.—But why that exclamation?

POIET.—What an immense fish! There he is!

HAL.—I see nothing.

POIET.—At the edge of the pool, below the fall, I saw a fish, at least two or three feet long, rising with great violence in the water, as if in the pursuit of small fish; and at the same time I saw two or three

minnows or bleaks jump out of the water. What fish is it?—a trout? It appeared to me too long and too slender for a trout, and had more the character of a pike;—yet it followed, and did not, like a pike, make a single dart.

HAL.—I see him: it is neither a pike nor a trout, but a fish which I have been some time hoping and expecting to see here, below the fall—a *salmo hucho*, or *huchen*. I am delighted that you have an opportunity of seeing this curious fish and of observing his habits. I hope we shall catch him.

POIET.—Catch him! we have no tackle strong enough.

HAL.—I am surprised to hear a salmon fisher talk so: yet he *is* too large to take a fly, and must be trolled for. We must spin a bleak for him, or small fish, as we do for the trout of the Thames or the salmon of the Tay. Ornither, you understand the arrangement of this kind of tackle—look out in my book the strongest set of spinning hooks you can find, and supply them with a bleak; and whilst I am changing the reel, I will give you all the information (which, I am sorry to say, is not much) that I have been able to collect respecting this fish from my own observation or the experience of others. The hucho is the most predatory fish of the salmo genus, and is made like an ill-fed trout, but longer and thicker.

He has larger teeth, more spines in the pectoral fin, a thicker skin, a silvery belly, and dark spots only on the back and sides,—I have never seen any on the fins. The ratio of his length to his girth is as 8 to 18, or, in well-fed fish, as 9 to 20; and a fish, 18 inches long by 8 in girth, weighed 16,215 grains. Another, 2 feet long, 11 inches in girth, and 3 inches thick, weighed 4lbs. 2¼oz. Another, 26 inches long, weighed 5lbs. 5oz. Of the spines in the fins, the anal has 9, the caudal 20, the ventral 9, the dorsal 12, the pectoral 17: having numbered the spines in many, I give this as correct. The fleshy fin belonging to the genus is, I think, larger in this species than in any I have seen. Bloch, in his work on fishes, states that there are black spots on all the fins, with the exception of the anal, as a character of this fish: and Professor Wagner informs me he has seen huchos with this peculiarity; but, as I said before, I never saw any fish with spotted fins,—yet I have examined those of the Danube, Save, Drave, Mur, and Isar: perhaps this is peculiar to some stream in Bavaria—yet the huchos in the collection at Munich have it not. The hucho is found in most rivers tributary to the Danube—in the Save and Laybach rivers always; yet the general opinion is that they run from the Danube twice a year, in spring and autumn. I can answer for their migration in spring, having

caught several in April, in streams connected with the Save and Laybach rivers, which had evidently come from the still dead water into the clear running streams, for they had the winter leech, or louse of the trout, upon them: and I have seen them of all sizes, in April, in the market at Laybach, from six inches to two feet long; but they are found much larger, and reach 30, or even 40, pounds. It is the opinion of some naturalists, that it is *only* a fresh water fish; yet this I doubt, because it is never found beyond certain falls—as in the Traun, the Drave, and the Save; and, there can be no doubt, comes into these rivers from the Danube; and probably, in its largest state, is a fish of the Black Sea.* Yet it can winter in fresh water; and does not seem, like the salmon, obliged to haunt the sea, but falls back into the warmer waters of the great rivers, from which it migrates in spring, to seek a cooler temperature and to breed. The fishermen at Grätz say they spawn in the Mur, between March and May. In those I have caught at Laybach, which, however, were small ones, the ova were not sufficiently developed to admit of their spawning that

[*During a residence of nine months in Constantinople, often visiting the fish-market in person, and making inquiry of persons most likely to give accurate information, I could not learn that the hucho had ever been seen there,—leading to the inference that it is unknown in the Black Sea,—from whence the Turkish capital is in part supplied with fish.—J. D.]

spring. Marsigli says, that they spawn in the Danube in June. You have seen how violently they pursue their prey: I have never taken one without fish in his stomach; yet, when small, they will take a fly. In the Kleingraben, which is a feeder to the Laybach river, and where they are found of all sizes—from 20lbs. downwards—the little ones take a fly, but the large ones are too ravenous to care about so insignificant a morsel, and prey like the largest trout, often hunting in company, and chasing the small fish into the narrow and shallow streams, and then devouring them.—But I see your tackle is ready. As a more experienced angler in this kind of fishing, you will allow me to try my fortune with this fish. I still see him feeding; but I must keep out of sight, for he has all the timidity peculiar to the salmo genus, and, if he catch sight of me, will certainly not run at the bait.

ORN.—You spin the bleak for him, I see, as for a great trout. O! there! he has run at it—and you have missed him. What a fish! You surely were too quick, for he sprung out of the water at the bleak.

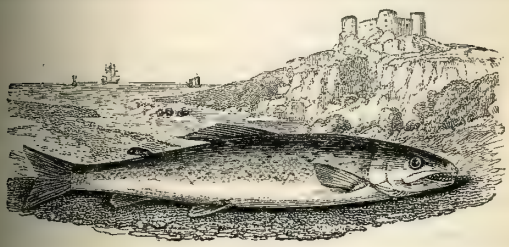
HAL.—I was not too quick; but he rose just as the bleak was on the surface, and saw me; and now he is frightened, and gone down into the deep water. We must retire till we see him feeding again, which will be, I hope, in a few minutes, for his violence shows he is not yet satisfied.

POIET.—I think I saw him moving in another part of the pool; it is now ten minutes since we saw him last.

HAL.—You are right; he is again on the feed, and in a place where we have a better chance of hooking him, as the water is deeper and in the shade. He has run again at the bleak, but only as it shone on the surface—but he is not frightened. Ah! he has taken it, and is floundering and struggling. He is a powerful fish.

ORN.—He fights well, and runs towards the side where the rock is.

HAL.—Take the net and frighten him from that place, which is the only one where there is danger of losing him. He is clear now, and begins to tire, and in a few minutes more he will be exhausted. Now land him.



Salmo Hucho.

POIET.—A noble fish. But how like a trout!—exactly like a sea trout in whiteness, and I think in spots.

HAL.—He is much narrower or less broad, as you would immediately discover, if you had a sea trout here. But now we must try another pool, or the tail of this; that fish was not alone, and at the moment he took the bait—I think I saw the water move from the stir of another. Take your rod and fit your own tackle, Ornither; half the glory of catching this fish is yours, as you prepared the hooks. I see you are in earnest; the blood mounts in your face. Oh! ho! Ornither, you have pulled with too much violence, and broken your tackle. Alas! alas! the fish you hooked was the consort of mine; he will not take again.

ORN.—The gut was bad, for I do not think I struck too violently. What a loss! How hard, to let the first fish of the kind I ever angled for escape me!

HAL.—There are probably more; try again.

ORN.—Behold, the loss was more owing to the imperfection of the tackle than to my ardour; for the two end hooks only are gone, and you may see the gut worn.

HAL.—The thing is done, and is not worth comment. If you can, let the next fish that rises hook himself. When we are ardent, we are bad judges of the effort we make; and an angler who could be cool with a new species of salmo, I should

not envy. Now all is right again; try that pool. There is a fish—ay! and another, that runs at your bait; but they are small ones, not much more than twice as large as the bleak; yet they show their spirit, and though they cannot swallow it, they have torn it. Put on another bleak. There, you have another run.

ORN.—Ay, it is a small fish, not much more than a foot long; yet he fights well.

HAL.—You have him, and I will land him. I do not think such a fish a bad initiation into this kind of sport. He does not agitate so much as a larger one, and yet gratifies curiosity. There, we have him. A very beautiful fish; yet he has the leech, or louse, though his belly is quite white.

ORN.—This fish is so like a trout, that, had I caught him when alone, I should hardly have remarked his peculiarities; and I am not convinced, that it is not a variety of the common trout, altered in many generations, by the predatory habits of his ancestors.

HAL.—How far the principle of change of character and transmission of such character to the offspring will apply, I shall not attempt to determine, and whether all the varieties of the salmo with teeth in their mouth may not have been produced from one original; yet this fish is *now* as distinct from the trout, as the *charr* or the *umbla* is; and in Europe, it exists only below great falls in streams connected

with the Danube, and is never found in rivers of the same districts connected with the Rhine, or Elbe, or in any of them which empty themselves into the Mediterranean; though trout are common in all these streams, and salmon and sea trout in those connected with the ocean. According to the descriptions of Pallas, it occurs in the rivers of Siberia, and probably exists in those which run into the Caspian; and it is remarkable, that it is not found where the eel is usual—at least this applies to all the tributary streams of the Danube, and, it is said, to the rivers of Siberia. Wherever I have seen it, there have been always coarse fish—as chub, white fish, bleak, &c., and rivers containing such fish are its natural haunts, for it requires abundance of food, and serves to convert these indifferent poor fish into a better kind of nourishment for man. We will now examine the interior of these fish. You see the stomach is larger than that of a trout, and the stomachs of both are full of small fish. In the larger one there is a chub, a grayling, a bleak, and two or three small carp. The skin you see is thick; the scales are smaller than those of a trout; it has no teeth on the palate, and the pectoral fin has four spines more, which, I think, enables it to turn with more rapidity. You will find at dinner, that, fried or roasted, he is a good fish. His flesh is white, but not devoid of curd; and

though rather softer than that of a trout, I have never observed in it that *muddiness*, or peculiar flavour, which sometimes occurs in trout, even when in perfect season.

I shall say a few words more on the habits of this fish. The hucho, as you have seen, preys with great violence, and pursues his object as a foxhound or a greyhound does. I have seen them in repose: they lie like pikes, perfectly still, and I have watched one for many minutes, that never moved at all. In this respect their habits resemble those of most carnivorous and predatory animals. It is probably in consequence of these habits, that they are so much infested by lice, or leeches, which I have seen so numerous in spring as almost to fill their gills, and interfere with their respiration; in which case they seek the most rapid and turbulent streams to free themselves from these enemies. They are very shy, and after being hooked avoid the baited line. I once saw a hucho, for which I was fishing, follow the small fish, and then the lead of the tackle; it seemed as if *this* had fixed his attention, and he never offered at the bait afterwards. I think a hucho, that has been pricked by the hook, becomes particularly cautious, and possesses, in this respect, the same character as the salmon. In summer, when they are found in the roughest and most violent currents, their fins

(particularly the caudal fin) often appear worn and broken; at this season they are usually in constant motion against the stream, and are stopped by no cataract or dam, unless it be many feet in height, and quite inaccessible. In the middle of September I have caught huchos perfectly clean in rapid cool streams, tributary to the Laybach and the Sava rivers; and, from the small development of their generative system at this time, I have no doubt that they spawn in spring. On the 13th of September, 1828, I caught, by spinning the dead small fish, three huchos, that had not a single leech upon their bodies, and they were the first fish of the kind I ever saw free from these parasites.

ORN.—I am so much pleased with my good fortune in catching this fish, that I shall try all day to-morrow with the bait, for more of the same kind.

HAL.—You may do so; but many of these fish cannot be caught; they migrate generally when the water is foul, and, except in the spring and autumn, do not so readily run at the bait. I was once nearly a month seeking for one in rivers in which they are found, between the end of June and that of July, without being able to succeed in even *seeing* one alive; and as far as my information goes, the two places where there is most probability of taking them, are at Laybach and Ratisbon, in the tributary streams to the

Sava, and in the Danube; and the best time, in the first of these situations, is in March and April, and in the second, in May. I am told, likewise, that the Isar, which runs by Munich, is a stream where they may be caught, when the water is clear: but I have never fished in this stream—it having been foul, either from rain or the melting of the snows, whenever I have been at Munich; but I have seen in the fish-market at Munich very large huchos. Late in the autumn, or in early spring, this river must be an interesting one to fish in, as the *schiel*, or *perca lucio perca*, and three other species of *perca* are found in it—the zingel, l'apron, and the perca schrätz—all fish of prey, and excellent food. I have eaten them, but never taken them; they are rare in European rivers, though not, like the hucho, peculiar to the tributary streams of the Danube. The schiel is found likewise in the Spree and in the Hungarian lakes, and, according to Bloch, the zingel in the Rhone.

POIET.—I should like extremely to fish in the Isar: it is, I think, a new kind of pleasure to take a new kind of fish, even though it is not unknown to Natural Historians. But the most exquisite kind of angling, in my opinion, would be that of angling in a river never fished in by Europeans before; and I can scarcely imagine sport of a higher kind than that

which involves a triple source of pleasure—catching a fish, procuring good food for the table, and making a discovery in Natural History, at the same time. Sir Joseph Banks, who was always a great amateur of angling, had often this kind of gratification. And to Captain Franklin and Dr. Richardson, in their expedition to the Arctic Ocean, when they were almost starving, what a delightful circumstance it must have been, to have taken with a fly those large grayling, which they mention, of a new species, equally beautiful in their appearance, and good for the table!

HAL.—When a boy, I have felt an interest in sea fishing, for this reason—that there was a variety of fish; but the want of skill in the amusement—sinking a bait with a lead and pulling up a fish by main force, soon made me tired of it. Since I have been a fly-fisher, I have rarely fished in the sea, and then only with a reel and fine tackle from the rocks, which is at least as interesting an amusement as that of the Cockney fishermen, who fish for roach and dace in the Thames, which I have tried twice in my life, but shall never try again.

PHYS.—You are severe on Cockney fishermen, and, I suppose, would apply to *them only*, the observation of Dr. Johnson, which on a former occasion you would not allow to be just: "Angling is an

amusement with a stick and a string; a worm at one end, and a fool at the other." And to yourself you would apply it with this change: "a fly at one end, and a philosopher at the other." Yet the pleasure of the Cockney angler appears to me of much the same kind, and perhaps more continuous than yours; and he has the happiness of constant occupation and perpetual pursuit in as high a degree as you have; and if we were to look at the real foundations of your pleasure, we should find them, like most of the foundations of human happiness—vanity or folly. I shall never forget the impression made upon me some years ago, when I was standing on the pier at Donegal, watching the flowing of the tide: I saw a lame boy of fourteen or fifteen years old, very slightly clad, whom some persons were attempting to stop in his progress along the pier; but he resisted them with his crutches, and, halting along, threw himself from an elevation of five or six feet, with his crutches, and a little parcel of wooden boats, that he carried under his arm, on the sand of the beach. He had to scramble or halt at least 100 yards, over hard rocks, before he reached the water, and he several times fell down and cut his naked limbs on the bare stones. Being in the water, he seemed in an ecstasy, and immediately put his boats in sailing order, and was perfectly inattentive to the counsel and warning

of the spectators, who shouted to him, that he would be drowned. His whole attention was absorbed by his boats. He had formed an idea, that one should outsail the rest, and when this boat was foremost he was in delight; but if any one of the others got beyond it he howled with grief; and once I saw him throw his crutch at one of the unfavoured boats. The tide came in rapidly—he lost his crutches, and would have been drowned, but for the care of some of the spectators: he was however wholly inattentive to any thing save his boats. He is said to be quite insane and perfectly ungovernable, and will not live in a house, or wear any clothes, and his whole life is spent in this one business—making and managing a fleet of wooden boats, of which he is sole admiral. How near this mad youth is to a genius, a hero, or to an angler, who injures his health and risks his life by going into the water as high as his middle, in the hope of catching a fish which he sees rise, though he already has a pannier full.

HAL.—Or a statesman, working by all means, fair and foul, to obtain a blue riband. Or a fox-hunter, risking his neck to see the hounds destroy an animal, which he preserves to be destroyed, and which is good for nothing. Or an aged, licentious voluptuary, using all the powers of a high and cultivated intellect to destroy the innocence of a beautiful virgin, for a

transient gratification to render her miserable, and by making a flaw in an inestimable and brilliant gem, utterly to destroy its value.

PHYS.—You might go on and cite almost all the objects of pursuit of rational beings, as, by distinction, they are called. But to return to your favourite amusement. I wonder that, with such a passion for angling, you have never made an expedition in one of our whalers—with Captain Scoresby for instance; you would then have enjoyed sport of a new kind.

HAL.—I should like much to see a whale taken, but I do not think the sight worth the dangers and privations of such a voyage. It would only be an amusing spectacle and not an enterprise, unless, indeed, I myself employed the harpoon; and after all it must be a tedious operation, that of watching the sinking and rising of a fish obedient to a natural instinct, which, in this instance, is the cause of his death.

POIET.—How?

HAL.—The whale, having no air bladder, can sink to the lowest depths of the ocean: and, mistaking the harpoon for the teeth of a sword fish or a shark, he instantly descends, this being his manner of freeing himself from these enemies, who cannot bear the pressure of a deep ocean, and from ascending and descending in small space, he puts himself in the

power of the whaler; whereas, if he knew his force, and were to swim on the surface in a straight line, he would break or destroy the machinery by which he is arrested, as easily as a salmon breaks the single gut of a fisher when his reel is entangled.

POIET.—My amusement in such a voyage, would be to look for the kraken and the sea snake.

HAL.—You have a vivid imagination, and might see them.

POIET.—Then you do not believe in the existence of these wonderful animals?

HAL.—No more than I do in that of the merman, or mermaid.

POIET.—Yet we have histories which seem authentic, of the appearance of these monsters, and there are not wanting persons who assert, that they have seen the mermaid even in these islands.

HAL.—I disbelieve the authenticity of these stories. I do not mean to deny the existence of large marine animals having analogies to the serpent; the conger we know is such an animal: I have seen one nearly ten feet long, and there may be longer ones, but such animals do not come to the surface. The only sea snake, that has been examined by naturalists, turned out to be a putrid species of shark—the *squalus maximus*. Yet all the newspapers gave accounts of this as a real animal, and endowed it with feet, which

do not belong to serpents. And the sea snakes, seen by American and Norwegian captains, have, I think, generally been a company of porpoises, the rising and sinking of which in lines would give somewhat the appearance of the coils of a snake. The kraken, or island-fish, is still more imaginary. I have myself seen immense numbers of enormous *urticæ marinæ*, or blubbers, in the north seas, and in some of the Norwegian *fiords*, or inland bays, and often these beautiful creatures give colour to the water; but it is exceedingly improbable, that an animal of this genus should ever be of the size, even of the whale; its soft materials are little fitted for locomotion, and would be easily destroyed by every kind of fish. Hands and a finny tail, are entirely contrary to the analogy of nature, and I disbelieve the mermaid upon philosophical principles. The dugong and manatee are the only animals combining the functions of the mammalia with some of the characters of fishes, that can be imagined, even as a link, in this part of the order of nature. Many of these stories have been founded upon the long-haired seal seen at a distance; others on the appearance of the common seal under particular circumstances of light and shade, and some on still more singular circumstances. A worthy baronet, remarkable for his benevolent views and active spirit, has propagated

a story of this kind, and he seems to claim for his native country the honour of possessing this extraordinary animal; but the mermaid of Caithness was certainly a *gentleman*, who, happened to be travelling on that wild shore, and who was seen bathing by some young ladies at so great a distance, that not only *genus* but gender was mistaken. I am acquainted with him, and have had the story from his own mouth. He is a young man fond of geological pursuits, and one day in the middle of August, having fatigued and heated himself by climbing a rock, to examine a particular appearance of granite, he gave his clothes to his Highland guide, who was taking care of his pony, and descended to the sea. The sun was just setting, and he amused himself for some time by swimming from rock to rock, and having unclipt hair and no cap, he sometimes threw aside his locks, and wrung the water from them on the rocks. He happened the year after to be at Harrowgate, and was sitting at table with two young ladies from Caithness, who were relating to a wondering audience the story of the mermaid they had seen, which had already been published in the newspapers. They described her as she usually is described by poets, as a beautiful animal, with a remarkably fair skin and long green hair. The young gentleman took the liberty, as most of the rest of the company

did, to put a few questions to the elder of the two ladies—such as, on what day, and precisely where this singular phenomenon had appeared. She had noted down, not merely the day, but the hour and minute, and produced a map of the place. Our bather referred to his journal, and showed that a human animal was swimming in the very spot at that very time, who had some of the characters ascribed to the mermaid, but who laid no claim to others, particularly the green hair and fish's tail; but being rather sallow in the face, was glad to have such testimony to the colour of his body beneath his garments.

POIET.—But I do not understand upon what philosophical principles you deny the existence of the mermaid. We are not necessarily acquainted with all the animals that inhabit the bottom of the sea; and I cannot help thinking there must have been some foundation for the fable of the Tritons and Nereids.

HAL.—Ay; and of the ocean divinities, Neptune and Amphitrite!

POIET.—Now I think you are prejudiced.

HAL.—I remember the worthy baronet, whom I just now mentioned, on some one praising the late Sir Joseph Banks very highly, said, "Sir Joseph was an excellent man—but he had his prejudices."

What were they? said my friend. "Why, he did not believe in the mermaid." Pray still consider me as the baronet did Sir Joseph—prejudiced on this subject.

ORN.—But give us some reasons for the impossibility of the existence of this animal.

HAL.—Nay, I did not say impossibility; I am too much of the school of Izaac Walton to talk of impossibility. It doubtless might please God to make a mermaid; but I do not believe God ever did make one.

ORN.—And why?

HAL.—Because wisdom and order are found in all his works, and the parts of animals are always in harmony with each other, and always adapted to certain ends consistent with the analogy of nature; and a human head, human hands, and human mammæ, are wholly inconsistent with a fish's tail. The human head is adapted for an erect posture, and in such a posture an animal with a fish's tail could not swim; and a creature with lungs must be on the surface several times in a day—and the sea is an inconvenient breathing place; and hands are instruments of manufacture—and the depths of the ocean are little fitted for fabricating that mirror which our old prints gave to the mermaid. Such an animal, if created, could not long exist; and, with scarcely

any locomotive powers, would be the prey of other fishes, formed in a manner more suited to their element. I have seen a most absurd fabrication of a mermaid, exposed as a show in London, said to have been found in the Chinese seas, and bought for a large sum of money. The head and bust of two different apes were fastened to the lower part of a kipper salmon, which had the fleshy fin, and all the distinct characters, of the *salmo salar*.

ORN.—And yet there were people who believed this to be a real animal.

HAL.—It was insisted on, to prove the truth of the Caithness story. But what is there which people will not believe?

POIET.—In listening to your conversation we have forgotten our angling, and have lost some moments of fine cloudy weather.

HAL.—I thought you were tired of catching trouts and graylings, and I therefore did not urge you to continue your fly-fishing; and this part of the river does not contain so many grayling as the pools above—but there are good trout, and it is possible there may be huchos. Let me recommend to you to put on minnow tackle—that tackle with the five small hooks; and, as we have minnows and bleaks, you may perhaps hook trout, or even huchos; and in half an hour our fish dinner at the inn will be ready. I

shall return there, to see that all is right, and shall expect you when you have finished your fishing.

[*They all meet in the dining-room of the inn.*]

HAL.—Well, what sort of sport have you had since I left you?

POIET.—We have each caught a trout and two large chubs, and have had two or three runs besides—but we saw no huchos; and though several large grayling rose in one of the streams, and we tried to catch them by spinning the minnow in every possible way, yet they took no notice of our bait.

HAL.—This is usually the case. I have heard of anglers who have taken grayling with minnows, but it is a rare occurrence, and never happened to me. Your dinner, I dare say, is now ready; and you know it is a dinner entirely of the *genus salmo*, with vegetables and fruit. You have hucho from the Traun, and charr from Aussee, and trout from the Traun See, that were brought alive to the inn, and have only just been killed and crimped, and are now boiling in salt and water; and you have likewise grayling and laverets from the Traun See, which are equally fresh, and will be fried.

PHYS.—I think, in this part of the continent, the art of carrying and keeping fish is better understood than in England. Every inn has a box containing

grayling, trout, carp, or charr, into which water from a spring runs; and no one thinks of carrying or sending *dead* fish for a dinner. A fish barrel full of cool water, which is replenished at every fresh source amongst these mountains, is carried on the shoulders of the fisherman. And the fish, when confined in wells, are fed with bullock's liver, cut into fine pieces, so that they are often in better season in the tank or stew than when they were taken. I have seen trout, grayling, and charr even, feed voraciously, and take their food almost from the hand. These methods of carrying and preserving fish have, I believe, been adopted from the monastic establishments. At Admondt, in Styria, attached to the magnificent monastery of that name, are abundant ponds and reservoirs for every species of fresh-water fish; and the charr, grayling, and trout are preserved in different waters—covered, enclosed, and under lock and key.

POIET.—I admire in this country not only the mode of preserving, carrying, and dressing fish, but I am delighted, generally, with the habits of life of the peasants, and with their manners. It is a country in which I should like to live;—the scenery is so beautiful, the people so amiable and good-natured, and their attentions to strangers so marked by courtesy and disinterestedness.

PHYS.—They appear to me very amiable and good; but all classes seem to be little instructed.

POIET.—There are few philosophers amongst them, certainly; but they appear very happy, and

Where ignorance is bliss, 'tis folly to be wise.

We have neither seen nor heard of any instances of crime since we have been here. They fear their God, love their sovereign, are obedient to the laws, and seem perfectly contented. I know you would contrast them with the active and educated peasantry of the manufacturing districts of England; but I believe they are much happier, and I am sure they are generally better.

PHYS.—I doubt this; the sphere of enjoyment, as well as of benevolence, is enlarged by education.

POIET.—I am sorry to say I think the system carried too far in England. God forbid, that any useful light should be extinguished! Let persons who wish for education receive it; but it appears to me, that, in the great cities in England, it is, as it were, forced upon the population; and that sciences, which the lower classes can only very superficially acquire, are presented to them, in consequence of which they often become idle and conceited and above their usual laborious occupations. The unripe fruit of the tree of knowledge is, I believe, always bitter or

sour; and scepticism and discontent—sicknesses of the mind—are often the results of devouring it.

HAL.—Surely you cannot have a more religious, more moral, or more improved population than that of Scotland?

POIET.—Precisely so. In Scotland education is not forced upon the people; it is sought for, and it is connected with their forms of faith, acquired in the bosoms of their families, and generally pursued with a distinct object of prudence or interest; nor is that kind of education wanting in this country.

PHYS.—Where a book is rarely seen, a newspaper never.

POIET.—Pardon me—there is not a cottage without a prayer-book; and I am not sorry that these innocent and happy men are not made active and tumultuous subjects of *King Press*, whom I consider as the most capricious, depraved, and unprincipled tyrant, that ever existed in England. Depraved—for it is to be bought by great wealth; capricious—because it sometimes follows, and sometimes forms, the voice of the lowest mob; and unprincipled—because, when its interests are concerned, it sets at defiance private feeling and private character, and neither regards virtue, dignity, nor purity.

HAL.—My friends, you are growing warm; I know you differ essentially on this subject; but

surely you will allow that the full liberty of the press, even though it sometimes degenerates into licentiousness, and though it may sometimes be improperly used by the influence of wealth, power, or private favour, is yet highly advantageous, and even essential to the existence of a free country: and, useful as it may be to the population, it is still more useful to the government; to whom, as expressing the voice of the people, though not always *vox Dei*, it may be regarded as oracular or prophetic. But let us change our conversation, which is neither in time nor place.

POIET.—This river must be inexhaustible for sport; I have nowhere seen so many fish.

HAL.—However full a river may be of trout and grayling, there is a certain limit to the sport of the angler, if continuous fishing be adopted in the same pools. Every fish is in its turn made acquainted by diurnal habit with the artificial fly, and either taken or rendered cautious; so that in a river fished much by one or two good anglers, many fish cannot be caught, except under peculiar circumstances of very windy, rainy, or cloudy weather, when many flies come on; or at night, or at the time the water is slightly coloured by a flood, or when fish change their haunts in consequence of a great inundation. In the Usk, in Monmouthshire, when it was very

full of fish, in the best fishing time, when the spring brown and dun flies were on the water, it was not usual for some excellent anglers, who composed a party of nine, and who fished in this river for ten continuous days, to catch more than two or three fish each person. But one day, when the water was coloured by a flood, in which case the artificial fly could not be distinguished by the fish from the natural fly, I caught twelve or fourteen of the same fish, that had been in the habit of refusing my flies for many days successively. This was in the end of March, 1809, when the flies always came on the water with great regularity; the blues in dark days, the browns in bright days, between twelve and two o'clock in the middle of the day. In rivers where the artificial fly has never been used, I believe all the fish will mistake good imitations for natural flies, and in their turn, to use an angler's phrase, "taste the steel;" but even very imperfect imitations and coarse tackle, which are only successful at night, or in turbid water, are sufficient to render fish cautious. This I am convinced of, by observing the difference of the habits of fish in strictly preserved streams, and in streams where even peasants have fished with the coarsest tackle. I might quote the Traun at Ischl, where the native fishermen used three or four of the coarsest flies on the coarsest hair links

made of four or five or six hairs, and the Traun, at Gmünden, where they are not allowed to fish; the fish that rose took with much more certainty at Gmünden than at Ischl. At a time when many flies are on, particularly large ones, a few days of continuous fishing, even with a single rod, will soon make the sport indifferent in the best rivers; but the larger and the deeper the river, the longer it continues, because fish change their stations occasionally, and pricked fish sometimes leave their haunts, which are occupied by others; and graylings are more disposed to change their places than trouts. As instances of the difference in this respect between large and small rivers, I may quote the Vöckla and the Agger in Upper Austria. The first of these rivers, when I fished in it in 1818, was full of trout and grayling, and I believe I was the first person, for at least many years, that had ever thrown an artificial fly upon it. It is a small stream, from eight to fifteen yards wide, and can every where be commanded by the double-handed rod, and is generally shallow. The first day that I fished in this stream, which was in the beginning of August, at every throw I hooked a fish, and I took out and restored again to their element in the course of a few hours more than one hundred and fifty trout and grayling. The next day I

fished in the same places, but with a very different result; I caught only half a dozen large fish: the third morning, going over the same ground, I had great difficulty even to get a brace of fish for my dinner, and those, as well as I recollect, I caught by throwing in places which had not been fished before. I ought to mention, that the space of water where this experiment was made did not exceed half a mile in length. I shall now speak of the Agger, which is a much larger and deeper river than the Vöckla, and cannot be commanded in any part by a double-handed rod, being at least from forty to sixty yards across. The first time I fished this river, I had the same kind of sport as in the Vöckla; the second day, under the same favourable circumstances, there were fewer rises than on the first day, but still sufficient to give good sport; and it was the fourth day before it became difficult to catch a good dish of fish, and necessary to seek new water. The greater depth of the water, and the change of place of the fish, particularly the grayling, explain this, to say nothing of the greater number of fish which the larger river contained. I am, of course, speaking of one of the best periods of fly-fishing, when many large flies, of which imitations are easily found, have been on the water. In spring (a bad season for fly-fishing in high Alpine countries) I have thrown great varieties of flies on these two

highly stocked streams, and have found it difficult to get a brace of fish for the table, as the trout and grayling were all lying at the bottom, not expecting any *winged food* at this season.

A river that runs into a large lake affords, at it junction with the lake, by far the best place for continuous angling, particularly for trout in autumn. The fish are constantly running up the river for the purpose of spawning, and every day offers a succession of new shoals, of which many will take the fly; I say *many*, because at this season some of the fish, particularly the females, are capricious, and refuse a bait, of which, under other circumstances, they are greedy. I may say the same with respect to the exit of a river from a lake, to which successions of fishes resort, and though trout are found abundantly in such places, yet they are often still better places for grayling when these fish exist in the lake, the tendency of grayling being rather, as I said on another occasion, to descend than to ascend waters, whilst that of the trout is the contrary. The same principles apply to salmon and sea-trout fishing, which run up rivers from basins of the sea: the best situations for continuous angling are those parts of the river where there is a succession of fishes from the tide.

POIET.—You spoke just now of peasants fishing with the fly in Austria: I thought this art was

entirely English; and though I have travelled much, I do not recollect ever to have seen fly-fishing practised by native anglers abroad.

HAL.—I assure you there are fishers with the artificial fly in different parts of Switzerland, Germany, and Illyria, though always with rude tackle, and usually upon rapid streams. Besides the Traun, I can mention the Rhine, the Rhone, and the Drave, as rivers where I have seen fish caught with rude imitations of flies used by native anglers. In Italy, where trout and grayling are very rare, and only found amongst the highest mountain chains, I have never seen any fly-fishers; but near Ravenna I have sometimes seen anglers for frogs, who threw their bait exactly as we throw a fly, and caught great numbers of these animals: and the nature of their apparatus surprised me more than their method of using it; instead of a hook and bait, they employed a small dry frog, tied to a long piece of twine, the forelegs of which projected like two hooks, and this they threw at a distance, by means of a long rod. The frogs rose like fish and gorged the small dry frog, by the legs of which they were pulled out of the water. I was informed by one of these fishermen that he sometimes took two hundred frogs in this way in a morning, and that the frogs never swallowed any bait when still or apparently dead, but caught at

whatever was moving or appeared alive on the surface of the water; so that this reptile feeds like a nobler animal, the eagle, only on living prey.*

POIET.—You say trout are rare in Italy, yet on Ash Wednesday, a great day for the consumption of fish in Rome, I remember to have seen some large trout, which, I was told, were from the Velino, above the Falls of Terni.

HAL.—I once went almost to the source of this river, above Rieti, in the hopes of catching trout, but I was unsuccessful. I saw some taken by nets, but the fish were too few, and the river too foul, from the deposition of calcareous matter, to render it a good stream for the angler. In this journey I saw some trout in brooks in the Sabine country, that I dare say might have been taken by the fly; but they were small, and like the brook trout of England. In these streams, as well as in the Velino and other torrents, I found the water-ouzel, which, as far as my knowledge extends, is always a companion of the trout, and I believe feeds much upon the same larvæ of water-flies.

[* In my work on the Ionian Islands, another kind of angling is noticed as practised there, and that with the fly—an aërial kind—for swallows. In spring, when these birds first arrive, and then crowd about the lofty cliffs of the little island of Paxo, the natives, standing or sitting on the dizzy margin, take them, when on the wing, with the bait mentioned, attached to a fine hook and line, throwing it into the air, very much in the same manner as in ordinary fly-fishing.—J. D.]

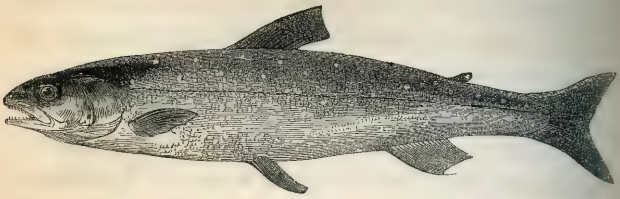
ORN.—These singular little birds, as I have witnessed, walk under water. I have often watched them running beneath the surface of the sides of streams, and passing from stone to stone; not, however, by means of air-pump feet, as I had once conjectured, but by laying hold with their claws of stones and the projecting parts of rocks. I conclude they were then in the act of searching for, or feeding upon, larvæ.

HAL.—I suppose so, and I hope Ornither will shoot one to give us an opportunity of examining the contents of their stomachs, and of knowing with certainty the nature of their food.

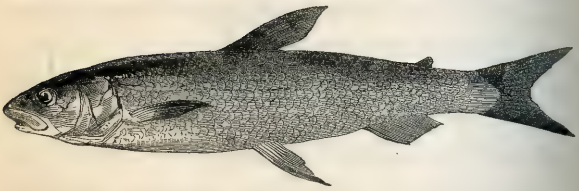
PHYS.—The charr * is a most beautiful and excellent fish, and is, of course, a fish of prey. Is he not an object of sport to the angler?

HAL.—They generally haunt deep cool lakes, and are seldom found at the surface till late in the autumn. When they are at the surface, however, they will take either fly or minnow. I have known some caught in both these ways; and have myself taken a charr, even in summer, in one of those beautiful, small, deep lakes in the Upper Tyrol, near Nassereit; but it was where a cool stream entered from the mountain; and the fish did not rise, but swallowed the artificial fly under water. The charr is

* Sälmling of the Germans.



Charr of Windermere.



Gwyniad, or Schelly of Hawes Water.

Charr of Hawes Water.

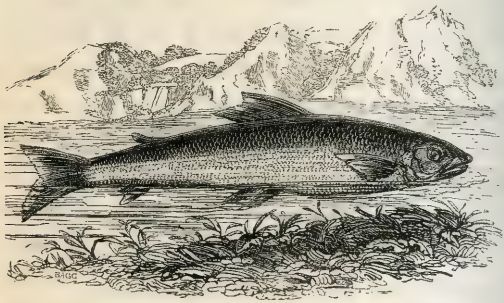
always in its colour a very brilliant fish, but in different countries there are many varieties in the tint. I do not remember ever to have seen more beautiful fish than those of Aussee, which, when in perfect season, have the lower fins and the belly of the brightest vermilion, with a white line on the outside of the pectoral, ventral, anal, and lower part of the caudal fin, and with vermilion spots, surrounded by the bright olive shade of the sides and back; the dorsal fin in the charr has 11 spines, the pectoral 14, the ventral 9, the anal 10, and the caudal 20. I have fished for them in many lakes, without success, both in England and Scotland, and also amongst the Alps; and I am told the only sure way of taking them is by sinking a line with a bullet, and a hook having a live minnow attached to it, in the deep water which they usually haunt; and in this way, likewise, I have no doubt the *umbla*, or *ombre chevalier*, might be taken.*

POIET.—I have never happened to see this fish.

HAL.—It is very like a charr in form, but is without spots, and has a white and silvery belly. On the table, its flesh cuts white or cream-colour,

[* In the lakes of Westmoreland and Cumberland, in which the charr is found, the manner of taking it varies; in Windermere trolling with a minnow is successfully used; in Hawes Water the artificial fly; in Crummock Water it refuses all baits, and is never caught except in the net.—J. D.]

and it is exceedingly like charr in flavour. Feb. 11, 1827, one was brought me from the lake of Bourget, in Savoy; it was said to be small for this fish—it



Umbla.

was 15 inches long, and $7\frac{1}{2}$ in circumference. In the dorsal fin there were 12 spines, in the pectoral 9, in the ventral 8, in the anal 11, and in the caudal 24.

POIET.—Is it found in this country?

HAL.—From some descriptions I have heard of certain species of the salmo found in the Maun See, Traun See, and Leopoldstadt See, I think it is. Bloch says, that it is peculiar to the lakes of Geneva and Neufchatel; but what I have just said must convince you of the inaccuracy of this statement, as I dare say the fish exists in other deep waters of a like character amongst the Alps. It is a fish closely

allied to the charr, and congenerous both in form and habits.*

PHYS.—You mentioned, among the fish for dinner, the laveret: I never heard of this fish before.

HAL.—It is a fish known in England by the name of *shelley*, or fresh-water herring; in Wales, by that of *gwyniad;* in Ireland, by that of *pollan;* and in Scotland, by that of *vendis*. In colour it is most like a grayling, but with broader and larger scales: it is common in the large lakes of most Alpine countries, and is known at Geneva by the name of *ferra;* and I believe that the *salmo cæruleus*, or *salmo Wartmanni* of Bloch, or the *gang-fisch* of the lake of Constance, from a comparison that I made of it with the *ferra*, is a variety of the same fish. It sometimes is as large as 2lbs.; and when quite fresh, and well fried or broiled, is an exceedingly good fish, and calvers like a grayling. The laveret of different lakes has appeared to me to vary in the number of the spines in the fins. One, brought me from the lake of Zurich, 13 inches long, and 8 inches in girth, had 12 spines in the dorsal fin, 15 in the pectoral fins, 11 in the ventral, 13 in the anal, and 18 in the caudal. The gang-fisch, from the lake of Constance,

[* According to M. Agassiz, the ombre chevalier and the charr of the lakes of the north of England, are merely varieties of the same species, putting aside colour as of no importance in relation to specific character.]

which was of a bluer colour, but, I think decidedly, only a variety of the same fish, was 7¾ inches long, and 4 in girth, had 12 spines in the dorsal fin, 15 in the pectoral, 11 in the ventral, 12 in the anal, and 18 in the caudal. A laveret, from the Traun See, had 12 spines in the dorsal fin, 17 in the pectoral, 13 in the ventral fin, 12 in the anal fin, and 24 in the caudal fin. One from the Halstadt See* was a larger and broader fish, but did not differ from the laveret of the Traun See, except in having two spines less in the tail.

POIET.—Is this fish ever taken with the line?

HAL.—I believe only with nets. It feeds on vegetables; and in the stomachs of those I have opened, I have never found either flies or small fishes.†

AT TABLE.

ORN.—Now the hucho is dressed, and on the same table with other species of the salmo, I perceive his peculiarities more distinctly; and, in addition to those you have mentioned, he appears to me to have a stronger upper jaw, and a larger projection of bone below the orbit of the eye.

* See Vignette, page 115.

[† This, its supposed manner of feeding, is doubtful.—See note at the end of the volume.—J. D.]

HAL.—He has; and you will find a similar character in the pike and perch, and, I believe, in most fishes of prey; and the use of it seems to be, to strengthen the fulcrum of the lever on which the lower jaw moves, so as to afford the means of greater strength to the whole muscular apparatus, by means of which the fish seizes his prey.

POIET.—These fishes, then, are analogous to the predatory animals of the feline genus, which have this part of the head exceedingly strong; and it is here that the craniologists or phrenologists fix the organ of courage: does not this extensive chain of analogies offer an argument in favour of this long-agitated and generally unpopular doctrine?

PHYS.—In my opinion, it offers, like most of the facts which have been brought forward to prove the truths of the view of Gall and Spurzheim, an argument rather unfavourable, when thoroughly and minutely examined.

POIET.—How?

PHYS.—In these rapacious and predatory animals, the organisation of the head must be connected with the functions of the jaws, as the construction of the shoulder-blade must be related to the use of the fore leg, which, being intended to strike and seize by talons, must have a powerful support and a strong bony apparatus in the shoulder, which might as well

be called the organ of courage as the projection below the frontal bone: but these animals have no more what is called courage in man, than they have what is called reason: they face danger when they are hungry, but almost always fly when their appetite is satisfied: a hen, in defending her chickens against a powerful dog, or the game cock, in fighting for the female, or the timid stag in the rutting season, shows quite as much of this quality as the most ferocious royal tiger. Courage is the result of strong passions or strong motives; and in man it usually results from the love of glory or the fear of shame; and it appears to me a perfectly absurd idea, that of connecting it with an organ which is merely intended to assist the predatory habits and the mastication of a carnivorous animal.

HAL.—I agree with Physicus in this view of the subject. I once heard a physiologist of some reputation deducing an argument in favour of craniology, from the form of the skull of the beaver, which he called a constructive animal, and contended, that there was something of the same character in the skulls of distinguished architects: now, the skull of the beaver is so formed, that he is able to use his jaws for cutting down the trees with which he makes his dam; and if this analogy were correct, the architect ought unquestionably to employ his teeth for the

same purpose; and though I have known distinguished men, who have been in the habit of using knives for cutting furniture with a sort of nervous restlessness of hand, I do not recollect to have heard of the teeth being employed in the same way; and I think it would be quite as correct to find the architectural or constructive organ in the opposite part of the body—the tail, as the beaver makes a more ingenious use of this part than even of his mouth.* Pray, have you ever observed, Poietes, any particular protuberance in the nether parts of any of our distinguished architects?

POIET.—I am not a craniologist; but I would have the doctrine overturned by facts, and not by ridicule; and I have certainly seen some remarkable instances, which were favourable to the system.

HAL.—My experience is entirely on the opposite

[* According to the popular idea, which by Hearne has been shown to be erroneous. In his work, "A Journey to the Northern Ocean," published in 1795, a full, and, I believe the first, accurate account is given of the habits of this intelligent and interesting animal. At the same time that he sweeps away the fictions of its romantic history, he describes particulars not less marvellous, as to the manner of its constructing its dwelling-places, with their entrances under water, and their dams on the equalising principle of mill-dams, to secure that these should be always under water. It is not the tail—structurally unfit—that the beaver employs in its works, "displaying a degree of sagacity and foresight of approaching evils little inferior to that of the human species," but its teeth and paws.—J. D.]

side; and I once saw a distinguished craniologist in error on a point which he considered as the most decided. He was shown two children, one of whom was possessed of great mathematical acquirements, the other of extraordinary musical taste. With the utmost confidence he pronounced judgment, and was mistaken. It appeared to me, that, whilst he was examining the two heads, he hummed an air, which, being out of tune, was not responded to by the musical child, but somehow struck the fancy of the mathematical one.

ORN.—This hucho is a very good fish, and, indeed, I can praise all the varieties of the salmo on the table that I have yet tasted.

PHYS.—Amongst them, I prefer the charr, which, I think, is even better than the best fresh salmon I ever tasted.

POIET.—This charr is surprisingly red and full of curd; I wonder at its fat: it comes from the Gründtl See, which is a high Alpine lake, covered with ice more than half the year: what food can the fish find in so pure and cold a water?

HAL.—Minnows and small chubs are found in this lake; and the flies which haunt it in summer have been aquatic larvæ in the autumn, winter, and spring; and there are usually great quantities of small shell fish, which live in the deeper parts of

this water; so that charr may find food even in winter; and cold, or the repose to which it leads, seems favourable to the development or conservation of fat. Most of the polar animals (the whale, morse, seal, and white bear, for instance) are loaded with this substance; and the salmon of the Arctic Ocean are remarkable for their quantity of curd: those that run up the rivers in Russia from the White Sea are said to be fatter and better than those caught in the streams which run into the Baltic.

ORN.—I agree with Physicus in his praise of the charr: we are indebted to you for an excellent entertainment.

HAL.—At Lintz, on the Danube, I could have given you a fish dinner of a different description, which you might have liked as a variety. The four kinds of perch, the *spiegelkarpfen*, and the *silurus glanis*; all good fish, and which I am sorry we have not in England, where I doubt not they might be easily naturalised, and they would form an admirable addition to the table in inland counties. Since England has become Protestant, the cultivation of fresh-water fish has been much neglected. The *burbot*, or *lotte*, which already exists in some of the streams tributary to the Trent, and which is a most admirable fish, might be diffused without much difficulty; and nothing could be more easy than to

naturalise the *spiegelkarpfen* and *silurus;* and I see no reason why the *perca lucio perca* and *zingel* should not succeed in some of our clear lakes and ponds, which abound in coarse fish. The new Zoological Society, I hope, will attempt something of this kind; and it will be a better object than introducing birds and beasts of prey—though I have no objection to any sources of rational amusement or philosophical curiosity.

POIET.—A fish dinner such as you have just described, combined with one such as we have enjoyed to-day, might, I think, be made an interesting experimental lecture on natural history. The analogies of the different species and genera of fishes, so distinct in the form of their organs, are likewise marked in the appearance and taste of their flesh. The salmon and the charr may be regarded as the generic types of the salmo. By trout, which have sometimes red and sometimes white flesh, they are connected with the grayling and hucho. By the grayling the trout is connected with the laveret, and by the laveret the genus salmo is connected with the carp genus. The charr is immediately connected with the grayling and laveret by the umbla. By the sea trout the salmon is connected with the trout; and by the hucho, with the pike and perch families.

HAL.—We will arrange a dinner of this kind in

England, and by means of it follow the analogies of salt and fresh water fishes. But the time for our parting is almost arrived.—Let us drink a glass each of this old wine of the Danube to our next happy meeting, and go and take a last look of the Fall of Traun, whilst our carriages are preparing.

[*They walk to the rock above the Fall of the Traun.*]

HAL.—See, the cataract is now in great beauty; the river above is coloured by the setting sun, and the glow of the rosy light on the upper stream is beautifully and wonderfully contrasted with the tints of the cataract below. Have you ever seen anything so fine?

POIET.—The lights are beautiful; but I have certainly seen a finer combination of features in the Fall of the Velino, at Terni, though that water is not clear; but, even with this defect, it is certainly the most perfect of European falls. This cascade of the Traun, though not so elevated as that of Terni, and not so large as that of Schaffhausen, yet, from its perfect clearness, and the harmony of the surrounding objects, ranks high, as to picturesque effect, amongst the waterfalls of Europe; and the wonderful transparency of its pale-green water gives it a peculiar charm in my eyes, enhanced as it is now by the light of the glowing western sky; and the tints of the

quadrant iris on its spray are not brighter than those of its stream and foam.

ORN.—We have now followed this water at least thirty miles, and wherever we have seen it, it has always displayed the same characters of clearness and rapidity—of green stream and white foam; and we have traced it from the snowy mountains of Styria to the plains of Upper Austria, where it serves to purify the darker Danube. How is it, that it has preserved its transparency, though so many of its tributary streams have been foul, either from the thunder storm, or from the sudden melting of snows?

HAL.—The three small lakes and the two larger ones, which are in fact its reservoirs, are the cause of this. The Gründtl See furnishes its principal stream, and this lake is fed by two others—Töplitz See and Lammer See; and the tributary streams, which unite at Aussee, from Alten Aussee and Oden See, though one is blue and the other yellow, yet combine to give a tint, which is nearly the same as that from the stream of the Gründtl See, and which the river retains throughout its course. Yet I have seen even this river very foul, but only in a part of its course, below Ischel. I was once at that place, when the thunder storm of a night having washed the dust of the roads into the river, it was extremely turbid from Ischel to the Traun See. It rendered the upper part

of this large lake coloured; but, notwithstanding this, the river came from the lower part of it perfectly clear, and I caught fish in it there with a fly, which at its entrance into the lake was quite impossible.

POIET.—You, Halieus, must certainly have considered the *causes* which produce the colours of waters. The streams of our own island are of a very different colour from these mountain rivers, and why should the same element or substance assume such a variety of tints?

HAL.—I certainly have often thought upon the subject, and I have made some observations and *one* experiment in relation to it. I will give you my opinions with pleasure, and, as far as I know, they have not been brought forward in any of the works on the properties of water, or on its consideration as a chemical element. The purest water with which we are acquainted is undoubtedly that which falls from the atmosphere. Having touched air alone, it can contain nothing but what it gains from the atmosphere, and it is distilled without the chance of those impurities, which may exist in the vessels used in an artificial operation. We cannot well examine the water precipitated from the atmosphere, as rain, without collecting it in vessels, and all artificial contact gives more or less of contamination; but in snow,

melted by the sunbeams, that has fallen on glaciers, themselves formed from frozen snow, water may be regarded as in its state of greatest purity. Congelation expels both salts and air from water, whether existing below, or formed in, the atmosphere; and in the high and uninhabited regions of glaciers, there can scarcely be any substances to contaminate. Removed from animal and vegetable life, they are even above the mineral kingdom; and though there are instances in which the rudest kind of vegetation (of the fungus or mucor kind) is even found upon snows, yet this is a rare occurrence; and red snow, which is occasioned by it, is an extraordinary and not a common phenomenon towards the pole, and on the highest mountains of the globe. Having examined the water formed from melted snows on glaciers in different parts of the Alps, and having always found it of the same quality, I shall consider it as pure water, and describe its characters. Its colour, when it has any depth, or when a mass of it is seen through, is bright blue; and, according to its greater or less depth of substance, it has more or less of this colour: as its insipidity, and its other physical qualities, are not at this moment objects of your inquiry, I shall not dwell upon them. In general, in examining lakes and masses of water in high mountains, their colour is of

the same bright azure. And Captain Parry states, that the water on the Polar ice has the like beautiful tint. When vegetables grow in lakes, the colour becomes nearer sea green, and as the quantity of impregnation from their decay increases—greener, yellowish green, and at length, when the vegetable extract is large in quantity—as in countries where peat is found—yellow, and even brown. To mention instances, the Lake of Geneva, fed from sources (particularly the higher Rhone) formed from melting snow, is blue; and the Rhone pours from it, dyed of the deepest azure, and retains partially this colour till it is joined by the Saone, which gives to it a greener hue. The Lake of Morat, on the contrary, which is fed from a lower country, and from less pure sources, is grass green. And there is an illustrative instance in some small lakes fed from the same source, in the road from Inspruck to Stutgard, which I observed in 1815 (as well as I recollect) between Nazareit and Reiti. The highest lake fed by melted snows in March, when I saw it, was bright blue. It discharged itself by a small stream into another, into which a number of large pines had been blown by a winter storm, or fallen from some other cause: in this lake its colour was blue green. In a third lake, in which there were not only pines and their branches, but likewise other decaying vegetable

matter, it had a tint of faded grass green; and these changes had occurred in a space not much more than a mile in length. These observations I made in 1815: on returning to the same spot twelve years after, in August and September, I found the character of the lakes entirely changed. The pine wood washed into the second lake had disappeared; a large quantity of stones and gravel, washed down by torrents, or detached by an avalanche, supplied their place: there was no perceptible difference of tint in the two upper lakes; but the lower one, where there was still some vegetable matter, seemed to possess a greener hue. The same principle will apply to the Scotch and Irish rivers, which, when they rise or issue from pure rocky sources, are blue, or bluish green; and when fed from peat bogs, or alluvial countries, yellow, or amber-coloured, or brown —even after they have deposited a part of their impurities in great lakes. Sometimes, though rarely, mineral impregnations give colour to water: small streams are sometimes green or yellow from ferruginous depositions. Calcareous matters seldom affect their colour, but often their transparency, when deposited, as is the case with the Velino at Terni, and the Anio at Tivoli; but I doubt if pure saline matters, which are in themselves white, ever change the tint of water.

ORN.—On what then does the tint of the ocean depend, which has itself given name to a colour?*

HAL.—I think probably on vegetable matter, and, perhaps, partially on two elementary principles, iodine and brome, which it certainly contains, though these are possibly the results of decayed marine vegetables. These give a yellow tint, when dissolved in minute portions in water, and this, mixed with the blue of pure water, would occasion sea green. I made, many years ago, being on the *Mer de Glace*, an experiment on this subject. I threw a small quantity of iodine, a substance then recently discovered, into one of those deep blue basins of water, which are so frequent on

[* The colour of the ocean out of soundings is blue, indeed blue water in the sailor's vocabulary is equivalent to being out of soundings. In shallow seas, in which light is reflected from the bottom, the various tints of the surface may be considered as depending chiefly on the modifying influence of the rays so reflected, being greenish, when the bottom is yellow, &c. At one time the blue colour of the ocean was supposed to be owing to the reflected hue of the atmosphere. That it is a property of the water itself, I have had proof, and often, in ocean voyages. The following is from a sea journal kept in 1820, when returning from Ceylon, and may be adduced in proof: referring to a gale, when no blue sky was to be seen, it is observed, "during this gale the sky was overcast, so as to be of the dark grey or light sooty hue, but the sea retained its usual colour. Its blue colour appeared very distinct, when one looked immediately down from the ship into the sea; and it was equally evident in the waves as they rose, their heads being between the light and eye of the observer. Even in the colour of the surface of the sea in general, a tint of blue might be distinguished, but it was not bright on account of the darkness of the surface."—J. D.]

that glacier, and, diffusing it as it dissolved with a stick, I saw the water change first to sea green in colour, then to grass green, and lastly to yellowish green: I do not, however, give this as a proof, but only as a fact favourable to my conjecture.

POIET.—It appears to me to confirm your view of the subject, that snow and ice, which are merely pure crystallised water, are always blue, when seen by transmitted light. I have often admired the deep azure in crevices in masses of snow in severe winters, and the same colour in the glaciers of Switzerland, particularly at the arch where the Arve issues, in the Valley of Chamouni. We thank you for your illustration.

HAL.—In return, I ask you for some further remarks on this grand waterfall. You said just now, you preferred the fall of the Velino for picturesque effect to any other waterfall you have seen; yet it is a small river compared even with the Traun, and nothing compared with the Gotha, the Rhine, or, above all, the Glommen.

POIET.—Size is merely comparative: I prefer the fall of the Velino, because its parts are in harmony. It displays all the force and power of the element, in its rapid and precipitous descent; and you feel that even man would be nothing in its waves, and would be dashed to pieces by its force. The whole scene is

embraced at once by the eye, and the effect is almost as sublime as that of the Glommen, where the river is at least one hundred times as large; for the Glommen falls, as it were, from a whole valley upon a mountain of granite, and unless where you see the giant pines of Norway, fifty or sixty feet in height, carried down by it and swimming in its whirlpools like straws, you have no idea of its magnitude and power. Yet still, I think, considering it in all its relations, this is the most awful fall of water I have ever seen, as that of Velino is the most perfect and beautiful. I am not sure that I ought not to place the fall of the Gotha above that of the Rhine, both for variety of effect and beauty; and the river, in my opinion, is quite as large, and the colour of the water quite as beautiful.

HAL.—But our horses are ready, and the time of separation arrives. I trust we shall all have a happy meeting in England in the winter. I have made you idlers at home and abroad, but I hope to some purpose; and I trust you will confess the time bestowed upon angling has not been thrown away. The most important principle, perhaps, in life is to have a pursuit—a useful one if possible, and at all events an innocent one. And the scenes you have enjoyed—the contemplations to which they have led, and the exercise in which we have indulged, have,

I am sure, been very salutary to the body, and, I hope, to the mind. I have always found a peculiar effect from this kind of life; it has appeared to bring me back to early times and feelings, and to create again the hopes and happiness of youthful days.

PHYS.—I felt something like what you described, and were I convinced that in the cultivation of the amusement, these feelings would increase, I would devote myself to it with passion; but I fear, in my case this is impossible. Ah! could I recover any thing like that freshness of mind, which I possessed at twenty-five, and which, like the dew of the dawning morning, covered all objects and nourished all things that grew, and in which they were more beautiful even than in mid-day sunshine, — what would I not give? All that I have gained in an active and not unprofitable life. How well I remember that delightful season, when, full of power, I sought for power in others; and power was sympathy, and sympathy power. When the dead and the unknown, the great of other ages and of distant places, were made, by the force of the imagination, my companions and friends; when every voice seemed one of praise and love; when every flower had the bloom and odour of the rose; and every spray or plant seemed either the poet's laurel, or the civic oak—which appeared to offer themselves as wreaths to adorn my

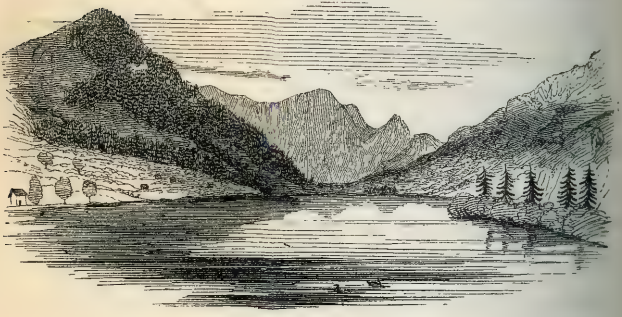
throbbing brow. But, alas! this cannot be; and even you cannot have *two springs* in life—though I have no doubt you have fishing days, in which the feelings of youth return, and that your autumn has a more *vernal* character than mine.

POIET.—I do not think Halieus had ever any season, except a perpetual and gentle spring: for the tones of his mind have been always so quiet, it has been so little scorched by sunshine, and so little shaken by winds, that, I think, it may be compared to that sempivernal climate fabled of the Hesperides, where the same trees produced at once buds, leaves, blossoms, and fruits.

HAL.—Nay, my friends, spare me a little, spare my gray hairs. I have not perhaps abused my youth so much as some of my friends, but all things that you have known, I have known; and if I have not been so much scorched by the passions from which so many of my acquaintances have suffered, I owe it rather to the constant employment of a laborious profession, and to the exertions called for by the hopes, wants, and wishes of a rising family, than to any merits of my own, either moral or constitutional. For my health, I may thank my ancestors after my God, and I have not squandered what was so bountifully given; and though I do not expect like our arch-patriarch, Walton, to number

ninety years and upwards, yet, I hope, as long as I can enjoy in a vernal day the warmth and light of the sunbeams, still to haunt the streams—following the example of our late venerable friend, the president of the Royal Academy,* in company with whom, when he was an octogenarian, I have thrown the fly, caught trout, and enjoyed a delightful day of angling and social amusement, in the shady green meadows by the bright clear streams of the Wandle.

* Benjamin West.



Gründtl Lake Upper Austria.

ADDITIONAL NOTES.

(*On the Parr, page* 69.)

THE author, in supposing that the parr may be produced from a cross between the river trout and the sea trout, does not mean to attach any importance to this idea. The fish differs so little from the common trout, that it may be questioned, whether it is not more entitled to the character of a variety than of a species. In many rivers on the continent, the author has seen small trout with olive or brown marks, like those of the British parr; and a friend informs him, that he has caught fish of the same kind in the streams connected with the Lake of Geneva.* In rivers, flowing into the Danube, these small fish are very common; but, as well as he remembers, their marks are pale or yellowish-brown, or olive, and not dark or blue like those of our parr. The salmon does not belong to any of these localities, but the hucho haunts the tributary streams of the Danube. The smelts, or young of the salmo hucho, and sea trout, and lake trout, are all distinguished by the *uniform* dark colour of the back, and the silvery whiteness of the belly. He does not remember to have seen any of the streaked, or parr varieties of trout in rivers, in which there was only *one* species, or variety of large salmo. The mottled colour of the skin is, he

[* The young of the common trout has transverse marks similar to those of the parr, though less distinct, yet sufficiently so to require an experienced eye to avoid mistaking the one for the other. These markings indeed seem to belong to fish of the salmon kind generally, and hence the facility of adopting the view proposed—hardly advocated—by the author, that the parr may be a hybrid: and that there may be such a hybrid appears from the results of the experiments of Mr. Shaw; he states that he has succeeded in hatching the ova of the salmon impregnated with the milt of the common river trout.—See "Days and Nights of Salmon Fishing," by Wm. Scrope, Esq. —J. D.]

thinks, the strongest argument in favour of this little fish being from a cross of two varieties, or races, which may be the case, and yet the fish be capable of breeding, and gaining this character of a peculiar variety; and he supposes different kinds of parrs may be produced by crosses of the sea trout, the hucho, the lake trout, with the river trouts, or perhaps of the salmon, and this would account for their great numbers, and the various tints of the marks on their *sides*. If the hucho, as he believes, generally spawns late in the winter, it may sometimes meet with trout spawning at the same time. He has seen salmon and trout in the Tweed in a similar state of maturity at the same period; and, in 1816, he remembers, that he took large female salmon, that had the period of parturition protracted as late as March.

(*On the Scolopax, page* 106.)

I shall say a few words on the congeners of this bird (the solitary snipe), and on the three varieties so much better known in Europe. The woodcock feeds indiscriminately upon earth-worms, small beetles, and various kinds of larvæ, and its stomach contains seeds, which I suspect have been taken up in boring among the excrements of cattle; yet the stomach of this bird has something of the gizzard character, though not so much as that of the land-rail, which I have found half filled with seeds of grasses, and even containing corn, mixed with may-bugs, earth-worms, grass-hoppers, and caterpillars. The woodcock, I believe, breeds habitually only in high northern latitudes, yet there are woods in England, particularly one in Sussex, near the borders of Hampshire, in which one or two couple of these birds, it is said, may always be found in summer. I suspect these woodcocks are from the offspring of birds which had paired for their passage, but being detained by an accident happening to one of them, staid and raised a young brood in England, and the young ones probably had their instincts altered by the accidents of their being born in England, and being in a place well supplied with food. It is not improbable, that they likewise raised young ones, and that the habit of staying has become hereditary. There can be no doubt, that woodcocks are very constant to their local attachments; woodcocks that have been preserved in a particular wood for a

winter, always return to it, if possible, the next season. Many woodcocks breed in Norway and Sweden in the great, extensive, and moist pine woods, filled with bogs and morasses, which cover these wild countries, but probably a still greater number breed further north, in Lapland, Finland, Russia, and Siberia. It is I believe a fable, that they ever raise their young habitually in the high Alpine or mountainous countries of the central or southern parts of Europe. These countries indeed in summer are very little fitted for their feeding; they cannot bore where it is either dry or frosty, and the glacier, as well as the arid sand or rock, are equally unfitted for their haunts. They leave the north with the first frost, and travel slowly south till they come to their accustomed winter quarters; they do not usually make a quick voyage, but fly from wood to wood, reposing and feeding on their journey; they prefer for their haunts, woods near marshes or morasses; they hide themselves under thick bushes in the day, and fly abroad to feed in the dusk of the evening. A laurel, or holly-bush, is a favourite place for their repose: the thick and varnished leaves of these trees prevents the radiation of heat from the soil, and they are less affected by the refrigerating influence of a clear sky, so that they afford a warm seat for the woodcock. Woodcocks usually begin to fly north on the first approach of spring, and their flights are generally longer, and their rests fewer, at this season than in the autumn. In the autumn they are driven from the north to the south by the want of food, and they stop wherever they can find food. In the spring, there is the influence of another powerful instinct added to this, the sexual feeling. They migrate in pairs, and pass as speedily as possible to the place where they are likely to find food, and to raise their young, and of which the old birds have already had the experience of former years. Scarcely any woodcocks winter in any part of Germany. In France there are a few found, particularly in the southern provinces, and in Normandy and Brittany. The woods of England, especially of the west and south, contain always a certain quantity of woodcocks, but there are far more in the moist soil and warmer climate of Ireland; but in the woods of southern Italy and Greece, near marshes, they are far more abundant; and they extend in quantities over the Greek Islands, Asia Minor, and northern Africa.

The snipe is one of the most generally distributed birds belonging to Europe. It feeds upon almost every kind of worm, or larva, and, as I have said before, its stomach sometimes contains seeds and rice; it prefers a country cold in the summer to breed in; but wherever there is much fluid water, and great morasses, this bird is almost certain to be found. Its nest is very inartificial, its eggs large, and the young ones soon become of an enormous size, being, often before they can fly, larger than their parents. Two young ones are usually the number in a nest, but I have seen three. The old birds are exceedingly attached to their offspring, and if any one approach near the nest, they make a loud and drumming noise above the head, as if to divert the attention of the intruder. A few snipes always breed in the marshes of England and Scotland, but a far greater number retire for this purpose to the Hebrides and the Orkneys. In the heather surrounding a small lake in the island of Hoy, in the Orkneys, I found in the month of August, in 1817, the nests of ten or twelve couple of snipes. I was grouse-shooting, and my dog continually pointed them, and, as there were sometimes three young ones and two old ones in the nest, the scent was very powerful. From accident of the season these snipes were very late in being hatched, for they usually fly before the middle of July; but this year, even as late as the 15th of August, there were many young snipes that had not yet their wing feathers. Snipes are usually fattest in frosty weather, which, I believe, is owing to this, that in such weather they haunt only warm springs, where worms are abundant, and they do not willingly quit these places, so that they have plenty of nourishment and rest, both circumstances favourable to fat. In wet, open weather, they are often obliged to make long flights, and their food is more distributed. The jack-snipe feeds upon smaller insects than the snipe: small white larvæ, such as are found in black bogs, are its favourite food, but I have generally found seeds in its stomach, once hemp-seeds, and always gravel. I know not where the jack-snipe breeds, but I suspect far north. I never saw their nest or young ones in Germany, France, Hungary, Illyria, or the British Islands. The common snipe breeds in great quantities in the extensive marshes of Hungary and Illyria; but I do not think the jack-snipe breeds there, for, even in July and August, with the first very dry weather, many

snipes, with ducks and teal, come into the marshes in the south of Illyria, but the jack-snipe is always later in its passage, later even than the double-snipe, or the woodcock. In 1828, in the drains about Laybach, in Illyria, common snipes were seen in the middle of July. The first double snipes appeared the first week in September, when likewise woodcocks were seen; the first jack-snipe did not appear till three weeks later than the 29th of September. I was informed at Copenhagen, that the jack-snipe certainly breeds in Zeeland, and I saw a nest with its eggs, said to be from the island of Sandholm, opposite Copenhagen, and I have no doubt that this bird and the double-snipe sometimes make their nests in the marshes of Holstein and Hanover. An excellent sportsman and good observer informs me, that, in the great royal decoy, or marsh-preserve, near Hanover, he has had ocular proofs of double-snipes being raised from the nest there; but these birds require solitude and perfect quiet, and, as their food is peculiar, they demand a great extent of marshy meadow. Their stomach is the thinnest amongst birds of the scolopax tribe, and, as I have said before, their food seems to be entirely the larvæ of the tipulæ, or *congenerous* flies.

(*On the Vitality of Fish, page* 78.)

The propriety of avoiding the too common practice of allowing the fish caught to die slowly, is pointed out. The experienced angler knows well, that by dislocating the spine of small fish, or by a blow on the head of the larger, death or loss of sensation is immediately produced. If not so treated, a trout may live an hour or two after having been taken from the water, —a retention of life chiefly indicated by the action of its gill-covers,—an action connected with the aeration of the blood, equivalent to respiration. The power of sustaining life out of water, and in water of different qualities, varies remarkably in different species of fish. The carp, we are assured, may be fed and fattened out of water, provided it be kept moist. The eel has almost the same power of supporting life in a moist atmosphere. The trout, like the salmon, can pass from fresh to salt water, and from the latter to the former, with impunity.* The

[* I have found a small trout, immersed as soon as caught in a solution of common salt of sp. gr. 1022, which is weaker than sea water, live as long as

torpedo, on the contrary, is instantly killed by removal from salt to fresh water, even more rapidly than if left exposed to the atmosphere. Such differences, so strongly marked, are deserving of the attention of the physiologist.—J. D.

(*On the Senses of Fishes, page* 26.)

That fishes have the sense of smell, may be inferred from the structure of their nostrils, as well as from the fact mentioned in note, page 26. Munro, in his work on "The Structure and Physiology of Fishes," published in 1785, reasoning from the ample and peculiar manner in which these parts are supplied with olfactory nerves, came to the conclusion "that they (fishes) are much more sensible of odorous bodies dissolved in water, and applied by its medium, than we should be, if the application of the object was to be made to an organ of smell through the same medium." The statement of the author, in page 26, founded, probably, on analogy, "that the principal use of the nostrils in fishes is to assist the propulsion of water through the gills, for performing the office of respiration," is not borne out by the structure of the parts. Each nostril has commonly two external apertures. They are well marked in the Salmonidæ—one free, the anterior, for the admission of water to the plicated membrane on which the nerve of smell is distributed; the other, the posterior, often valvular, by which the water passes out. The absence, indeed, of such an opening of communication between the nostrils and pharynx, is one of the characteristics by which fishes and reptiles in their greatest generality are distinguished.

Whether fishes have the sense of taste, has been held to be doubtful, as papillæ, it is said, have not yet been detected in their tongues. But in considering the question, it should be kept in mind that this sense has been enjoyed without papillæ, without a tongue (see the well-authenticated case recorded in the Phil. Trans. 1742 and 1747), and that it is probable it is more or less perceived whenever there are branches of the gus-

if put into an equal quantity of fresh water; whilst another immersed in a solution of higher sp. gr., viz. 1048, which is much salter than sea water, died in a few minutes, as did also a young parr similarly treated.—J. D.]

tatory nerves. Now, as fishes are not destitute of these nerves, it may be inferred they are not without the power belonging to them. Reflecting, however, on the general structure of their mouth, it seems likely that the sense is no wise refined, and is rather for discrimination than enjoyment, and that commonly it has little attention paid to it. Their manner of feeding, too, coarse as it is (swallowing commonly entire articles of food,—regardless, seemingly, whether dead or alive,—as live insects are often met with in the stomach of the trout), favours the inference. A friend of mine, an acute observer, in conversation on this subject, remarked to me, "If you watch a trout from a bridge, you will see that he takes into his mouth, as it were for trial, all small floating objects within his reach, whether fit or unfit to administer to his nourishment, rejecting the latter, retaining and swallowing only the former." And, I may add, the experienced angler acts as if aware of this, knowing how little is his chance of success, unless he be on the alert, with eye intent and hand ready to strike the instant the fish seizes his fly.

As regards another sense—that of hearing, not alluded to by the author—there can be no doubt that it is possessed by fishes, as they have an auditory apparatus and nerves, and as the medium they inhabit is capable of conveying the vibrations required to act on these nerves. Angling being truly "the contemplative man's recreation," the avoidance of noise by the river-side need not be exhorted; nor need gentle sounds—all such as are not unsuitable to the time and occasion—be apprehended; as, from the structure of the ear of fishes, it may be inferred that their organ of hearing is a dull one, fitted, as we find everything in nature is, to the circumstances and wants of the creature. Walton, in his "Complete Angler," adduces instances from Bacon, Pliny, and others, in proof of fishes having the power of hearing, adding, "It shall be a rule for me to make as little noise as I can when I am fishing, until Sir Francis Bacon be confuted, which I shall give any man leave to do;" concluding with the exhortation that anglers "should be patient, and forbear swearing, lest they be heard, and catch no fish."

Of all the senses, that of sight seems to be possessed in the highest degree of acuteness and power by fishes, especially the Salmonidæ, judging from the structure of their eyes and the manner in which they are alarmed by passing objects such as

they are not familiar with, or know only as enemies. By means of three powerful muscles, their movable eyes can be either withdrawn into their deep sockets or made more prominent, and can be turned in any direction; and the lens, from its yielding nature, may have its form—that of a perfect sphere—more or less changed, more or less compressed and flattened; and, in addition to a fine mechanism of the ball in its several parts, the eye has a very large optic nerve of a magnitude, indeed, extraordinary compared with the small mass of brain.

For success in angling, too much attention cannot be paid to the power of sight of the fishes of this family. As a general rule, it may be laid down, that he who fishes with the longest line—who can keep most out of sight, will take the largest number, and fish of the largest size. Even when the light is obscure, as at the time of advanced summer twilight, the visual faculty of the trout seems to be little less powerful than in broad daylight, as if it had the power—which it probably possesses—of adapting its eye to the degree of light; a power, it may be remarked, very suitable to its habits of feeding at night as well as by day.—J. D.

(*On the Colouring of the Salmonidæ, page* 36.)

It has been observed that the colouring of the trout as well as its form depends a good deal on its condition; that when well fed, it has a smaller head and more rounded body, and a more silvery lustre. The smaller head and more rounded and larger body—considered merely proportional,—[the latter liable to augmentation from deposition of fat, from which the other is exempt,] requires no comment. The more silvery hue of the well-fed fish seems to depend on many circumstances connected with its organisation, especially its scales and other integumentary parts, and the adipose matter beneath them. The scales have some resemblance to pearls in their composition, consisting of membrane not soluble in muriatic acid, and destructible by fire, and of phosphate of lime, soluble in the acid and resisting the fire. After the separation of the phosphate of lime by an acid, or of the animal matter by fire, the form of the scale remains with its peculiar linear markings, denoting a concentric growth, but the pearly lustre in each instance is lost. The scale, undoubtedly, is one cause of the silvery hue, and,

most of all, I believe its outer lamina; for if the scales be triturated so as to rub off this portion, their lustre is diminished; and if incinerated—some that have been triturated before exposure to fire, others that have not been so treated—a difference will be perceived in them on microscopical examination; those not triturated seem to be composed of a milky white part attached to another of a light brownish hue, whilst those that have been triturated consist, with few exceptions, of the latter. The brownish hue seems, from the trials I have made on it, to be owing to the presence of a minute portion of iron. The scales, it must be kept in mind, are more or less transparent, allowing the colouring matter, on which the hues and spottings of the fish depend, to be seen through them. Accordingly, as this subjacent colouring matter varies in its hues, so will the general colour of the fish vary. In well-fed fish, the abdomen of which is so silvery, there is both on the outer and inner surface of the cutis a layer of white matter reflecting a pearly lustre; and the cutis itself being transparent, it is to this matter as much as to the scales, or perhaps even more, that the silvery hue of the part is owing. It is instructive to examine the skin in part deprived of its scales, and in part with them remaining on, especially if dried on glass. So prepared, it is manifest how little the scales have to do with its colouring, and the degree in which they are concerned with its lustre. These remarks are derived from the examination of the scales of the smolt and of the young trout, and are applicable I believe to those of the full-grown fish of each kind. In the instance of the full-grown salmon, that portion of the fish which is most silvery, owes its lustre in great measure to the abundance of scales and the manner in which they overlap; where thickest, two or three, one over the other, may be detached from the same spot. When their animal matter is consumed by fire, and they are viewed under the microscope, their upper surface is seen to be more brilliant than their under, and to exhibit a linear or ridgy structure which is hardly, if at all, to be seen in the under. When the phosphate of lime is removed by an acid, the appearance under the microscope is such as to give the idea in accordance with the preceding, that there is forming on the upper surface a furrowed layer or lamina which the under is destitute of, and less lustrous and pearly in consequence.—J. D.

(*On the Structure of Stomach of the Gillaroo Trout, page* 54.)

The author, in noticing the stomach of the gillaroo or gizzard trout, remarks that it has been improperly compared to a fowl's. According to Henry Watson and John Hunter, who first described it, it differs from the stomach of the common trout principally in the circumstance of its being thicker. Hunter found the one he examined two-thirds thicker, with an inner, fine, villous coat. Watson describes it as composed of three coats, an internal, a middle, and an external one. "The external," he states, "is a kind of peritoneal covering common to the stomach, intestines, and other viscera. The middle coat appears to be of a fibrous muscular texture, pretty thick in flesh, stronger than in the salmon, and of a yellowish colour. The internal coat has a rough but not rugous surface. It is spongy and perhaps glandular, with a kind of honeycomb texture and strong villi, a little similar to the internal appearance of the gall bladder in the human subject." He adds that it will not bear any comparison with the gizzard of birds of the gallinaceous kind, which has powerful muscles with tendons, and a thick horny inner lining—in brief, a grinding apparatus. Hunter and Watson's papers are in the *Phil. Trans.* for 1774; and in the same volume and preceding them is one by Daines Barrington, in which the peculiarity of the gillaroo trout is first noticed. He says, "The first time I ever happened to hear of this singular fish, was from an Irish judge, who being on the Connaught circuit at Ballinrobe, in the county of Mayo, expressed his incredulity with regard to their existence, but was obliged to pay the common Irish wager of a rump of beef and a dozen of claret, on three or four being produced the next day from a neighbouring lake." From what he afterwards mentions, it would appear that the stomach of this trout in Ireland was at that time considered a delicacy, "white, and excellent eating." He says, "I have been informed by Lord Louth, that he had seen a small dish, consisting merely of such gizzards, at an Irish table in Galway; and I could corroborate this fact, was it necessary, by the testimony of an Irish archbishop." In notes appended to Barrington's paper, mention is made of a white

and red gillaroo, in Lough Derg, the former with black spots on it, the latter with red. The white is described as the smallest and the better eating, the size varying from two to twelve pounds. The author, page 55, speaks of the gillaroo as "a sort of link between the trout and charr," from a certain resemblance of stomach. The stomach of the charr, it is worthy of remark, varies, it may be inferred, with the quality of its food; in many instances I have found it even thinner in its coats than that of the common trout.—J. D.

(*On the Salmon and Parr, page* 59.)

Since "Salmonia" was first published, so much additional information has been obtained, respecting the salmon, in its early stage, its growth, and changes, that the question, so much agitated, whether the Parr is a young salmon or a distinct species, may be considered now as satisfactorily solved.

The inquirers to whom we are most indebted for facts on the subject, are Mr. Shaw and Mr. Young. The conclusions at which they have arrived, the result of their observations, may be briefly noticed.

According to Mr. Shaw, who took the lead in the inquiry, the parr is a young salmon, or a young sea-trout (distinguishable, he thinks, by certain peculiarities *), which becomes a smolt, or acquires the silvery hue of the adult fish, though remaining of small size, towards the end of the second year of river life, preparatory to migrating seaward.

According to Mr. Young, the salmon is a fresh-water fish, and is an inhabitant of fresh water, on an average, ten months out of the twelve, descending only to the sea (judging from the effect) for the purpose of that high feeding essential to its growth, and often returning to the river before its ova are developed; the

* The smolts of the salmon, and of the sea-trout of the Solway, he states, do not differ in size, but in some respects in colour, most marked in the fins, the extremities of the pectoral fins of the sea-trout smolt being orange, with a tendency to the same colour in the ends of the dorsal and caudal rays, whence this smolt is there called the orange fin.

It would appear from his observations that the female sea-trout can have mature ova, and breed without descending to the sea, and that a certain number actually do so, without assuming their silvery migratory dress, thus approximating to the common trout.

time required for which, may be from four to six months. Its spawning season, he states, extends over six months, commencing about the middle of September, and ending about the middle of March; the height of the process being from the middle of November to the middle of December,—the earlier the safer, each fish spawning where it had been bred, male and female associated, side by side, but not in contact,—the spawn being shed on the ova, immediately on exclusion, both fishes co-operating in making the spawn-bed in the gravel, and in covering it as soon as laid. This operation on the part of the male and female occupies from five to ten days. The time of hatching the ova he estimates at from one hundred to one hundred and forty days, varying with the temperature of the water. During the greater part of the first month, the young fish, then hardly an inch long (three quarters of an inch when first produced), mainly depends for its support on the yolk contained in the vitelline sac, which, about the end of that time, ceases to be seen externally. After two months, it loses its early peculiarities, the most marked of which is a posterior surrounding marginal fin, very like that of the tadpole; now, its transverse markings (bars) begin to appear. At four months it is about two inches in length; at six, about three; at eight and nine, it is very little larger, but thicker; at ten, it is from three to three and a half, when its transverse bars begin to disappear,—the silvery scales, those of the smolt covering and obscuring them; finally, at twelve months, it is from four to six inches, on an average about five, and is now a smolt, with its silvery migratory coat, and commonly migrates to the sea, descending in small shoals, from the middle of April to the middle of May. After remaining about eight weeks in salt water, it returns a grilse, vastly increased in size, varying in weight, according to the time it has remained in the sea, from three to eight pounds.

Mr. Shaw's observations on the salmon are to be found in the 14th vol. of the "Transactions of the Royal Society of Edinburgh," and his observations on the sea-trout, in the 15th vol. of the same publication; Mr. Young's, on the salmon, in the last-mentioned volume, and more in detail in his "Natural History of the Salmon." Happily they agree in their general statements, especially in relation to the time required for the maturation of the ova—the production of the young fish. The circumstance of

most importance about which they differ, is as to the time that the young salmon remains in fresh water, before migrating to the sea; Mr. Shaw, as already mentioned, fixing the period at two years—Mr. Young at one year. This is a point that needs further inquiry. Comparing Mr. Shaw's results with those of Mr. Young,—relying, as I think we may, on the accuracy of each,—we have the assurance of the latter regarding the accuracy of the former,—the conclusion seems probable, that in some rivers the young salmon becomes fit to migrate, and does migrate after twelve months—reckoning from the time of its birth—and in others, not till double that period; a difference, supposing it to exist, depending, it may be, on season of spawning, whether early or late, temperature of water, supply of food, and, perhaps, peculiarity of fish, as to rate of growth. Mr. Shaw mentions a few instances in which the parr assumed its migratory dress at the age of twelve months, and this was in water of somewhat higher temperature than ordinary. Mr. Young attributes the earlier migration of the fish, he observed, to an influence, hastening the smolt-change, derived from proximity to the sea, but of what kind he does not explain. From such information as I have been able to collect, the shorter period is that observed by the salmon-fry, in the rivers of Westmoreland and Cumberland, generally in accordance with Mr. Young's statements. Here, as commonly elsewhere, the parr, or brandling season, is in summer and autumn; the smolt or smelt season in spring. In St. John's Beck, a stream which flows out of Thirl mere, and is, comparatively, but little variable as to temperature and height, I have never yet met with a single brandling in April, and with a few only in the latter part of May, nor with a single smolt during the summer, autumn, and winter months. In the Duddon and Irt rivers, subject to great variation of temperature and volume of water, the seasons of the parr and smolt are the same as in the last-mentioned river; but in spring, amongst the smolts, a parr may occasionally be taken, probably the offspring of a late, a spring-breeder of the year preceding.

It is right, however, to mention, that most of the experienced fishermen on these rivers are in favour of the two years' abiding of the young of the salmon in fresh water; and the same opinion, I am informed, prevails on the subject amongst the fishermen of the Welsh salmon rivers; and in proof of its correctness, it is

cious than the female, and is capable of exercising the generative function long before the attainment of full growth, even as early as its fourth month, and of exercising it with effect, like the parr, on the ova of its parent, when next needed. (See a paper communicated by me on the early generative power of the kid, in the "Proceedings of the Zoological Society," for May, 1847.)

That the parr, before the facts referred to were brought to light, should have been considered a distinct species, is not to be wondered at, especially taking into account that there are other differences (comparing the parr and the smolt) besides those already mentioned, as the situation of the fins, and the form of body and its proportions. In the smolt, the dorsal fin is nearer the head than in the parr, and is comparatively larger than that of the parr, whilst its general form is more delicate and elongated; but how small are these differences by the side of the greater which we witness in the young of so many other animals during their period of growth, and which, no doubt, had they been examined under circumstances like those under which the parr was first noticed, might have given them claim, however false, to be ranked as species—distinct adult species.—J. D.

(*Queries relative to the Natural History of the Trout, page* 64.)

The early history of the common trout in minute and exact detail is yet a desideratum. Precise observations on its breeding-period, on the development of its ova, and the rate of growth of the young fish, like those made by Mr. Shaw and Mr. Young on the salmon, are needed, and would be especially useful in relation to the stocking and preserving of trout-streams, and the fair sport of the angler. Were such observations made on fish, under different circumstances, as to temperature of water, quality and quantity of food, their value would be greatly increased. The *widest* limit of the spawning season of the trout, in the *same* river, and whether it varies materially in *different* rivers, remain yet to be determined; and also whether it breeds, as Bloch asserts, every year, or, more commonly, every second year, and also at what age it has the power of propagating. That its spawning season extends over several months, is certain; and also, that in most of our rivers it begins in September, is at its height in the latter end of October and beginning of November, and does not

end till December, or later. It is certain, too, judging from an examination of the testes and ovaries during the breeding-time, that, as in the instance of the salmon, several days are required for the laying of the ova. Further, it is well ascertained, that during the whole of this period, that is, from September till December, many trouts are found either with the ovaries and testes only just visible, or so little developed as not to admit of the conclusion of their spawning till the following season. These fish are commonly not out of condition, like those that are breeding; and are to be taken, not where the latter most resort to—the small streams, the feeders of the lakes and rivers —but in the lakes and rivers themselves;—in brief, in their old haunts. This separation of breeders and non-breeders may be viewed as a happy provision of nature for the preservation of the species, inasmuch as the latter feed greedily on the ova of the former, and, were they together, would prove very destructive of roe—enemies of their own kind, not less than of the nobler salmon in its spawning-bed, as is well insisted on by Mr. Young. Probably, the trout is capable of propagating when two years old, and of attaining, if well fed, a goodly size at that age.—J. D.

(*On the Spawning Localities of the Charr, page* 70.)

The author states that "the charr spawns in still, and the trout in running water." By a gentleman, an able naturalist, who has paid great attention to the history of the Salmonidæ, but without opportunities of making special observations on the breeding of the charr, I have heard it asserted that this statement is erroneous, he maintaining that the charr, like the trout, spawns only in streams. This is a question which must be determined not by analogy but by experience. The information I have been able to collect in the Lake district, where the charr is so common, accords not with his view but with the author's. I have been assured by experienced fishermen, whose accuracy I cannot doubt, that the ova of this fish have been found on the shallow banks in the lake of Windermere,—spots where the charr resorts in great numbers during the spawning season. Moreover, that part of the Brathay—a river that flows into Windermere—another great spawning-place of the charr, well described by Mr. Yarrell, in his "History of

British Fishes"—is a pool, a miniature lake, where the water can be little more in motion—more impregnated with air—than in the lake itself, rarely an hour unruffled by the wind. In Hawes Water, in which the charr, the trout, and the shelley are all abundant—it being one of the few Westmoreland lakes in which poaching is prevented—the charr, I have been informed, breeds only in the lake: the keeper, in the course of six years' observation, never knew or heard of an instance of a single charr having been taken in any of the tributary streams—the breeding-streams of the trouts. A figure of the charr of this lake is given in page 260. It is, probably, merely a variety of the northern charr, owing its peculiarities to local circumstances. It is proportionally a much larger fish than the northern charr, or that of Windermere, Buttermere, and Coniston Water. It differs, too, in rising freely at the fly. In one day, I was told, two anglers in Hawes Water took nine dozen, without taking a single trout. And, when in season, it is less fat, and has, I think, a more delicate flavour. The charr of Buttermere, and of its neighbouring lake, Crummock Water, I have also been assured, never enters the tributary rivers, and breeds only in the lakes; and it, whether of Buttermere or Crummock Water, closely resembles the charr of Windermere. Yet it has its peculiarities. Though similar in general form and colouring, it has a thicker stomach than the charr of Windermere; has (a specimen that I examined) a rose-coloured air-bladder, and, when of full size, is said never to be taken with a fly or any bait, and even when only half-grown, and less, is but rarely taken with the fly. I have obtained similar information relative to the breeding-places of the charr in other two lakes of the same district, viz., Coniston Water and Ulles Water; * and hence leading to the conclusion that still water rather than running is most appropriate to it, and that its even resorting to a river, as in the instance of the sluggish part of the Brathay, is to be held as an exception.—J. D.

(*On the Young Trout on quitting the Egg, page* 71.)

It is stated by the author, that the young trout, after bursting the egg, when it subsists on the supply of food by nature

* Since mines have been opened in the vicinity of these lakes, the charr in the former has become scarce; and it is no longer found in the latter.

provided in its yolk-bag, may for some days, as requiring no food *ab externo*, be easily conveyed from place to place in confined portions of fresh water. Judging from the analogy of the young salmon, and from what I have learned respecting the young trout, its time of easy and safe conveyance may be extended to a few weeks, at least five and probably six or seven. We are informed by Mr. Young, in his "History of the Salmon," that the internal yolk-bag protruding from the abdomen of the young fish, does not disappear till the end of the fifth week, reckoning from the time of hatching; nor, I believe, does it disappear earlier in the instance of the trout. Moreover, as in the young of those cartilaginous fishes which have been examined, the internal yolk-bag has been found to increase as the external has diminished, reasoning from analogy, it may be inferred that the same probably occurs in the instance of the Salmonidæ, and consequently that they have included within themselves a store of food in the inner yolk-bag, sufficient to support them altogether or in part, considerably beyond the fifth week. In a young torpedo which I examined when six months old, a vestige of the inner yolk was even then discoverable. There are other circumstances which may be mentioned as favourable to the transport of fishes shortly after hatching, viz. their greater irritability and tenacity of life, denoted by the length of time their heart continues to act when removed from the body, and the season of the year,—the winter season, when the colder water has a larger proportion of atmospheric air, and retains it longer than the warmer water of a milder season.—J. D.

(*On the Digestive Powers of the Salmonidæ, page* 112.)

The author alludes to the digestion of the salmon as being very quick. It appears to be so in all the Salmonidæ, and is probably connected with power of rapid growth, which is so remarkable in the majority of them, when abundantly supplied with food. Proof of such quickness of digestion is often afforded in the dead fish; often and often I have found in the trout and salmon-fry that portion of its abdominal parietes, corresponding to the lower part of the stomach, and the upper part of the intestine, reduced to a soft, pulpy state, approaching to chyme, and not unfrequently a portion, also, of

the stomach itself so changed,—effects, it may be inferred, of the gastric fluid, as explained by John Hunter, in his well-known paper, "On the digestion of the stomach after death." In accordance with the quickness of digestion and facility of assimilation is, I believe, the manner in which the kidneys perform their function. They appear to be comparatively inactive, thereby allowing the greater portion of the azotised matter of the food to be assimilated, and applied to the growth of the animal. What a contrast is offered in the excreta of the swallow and trout, when, as in summer, both subsist on flies! Amongst those of the fish it is difficult to detect the urinary secretion; whilst in those of the bird it is conspicuous and abundant, consisting principally of lithate of ammonia; and this is the more remarkable in the instance of the fish, as it is provided with a urinary bladder.

In connexion with the solvent power of the contents of the stomach, and the tendency of the bile in the gall-bladder and the contents of the intestines, readily putrescent, to penetrate and taint, and so injure the flavour of fish, it may be well to caution anglers, who wish to keep the fish they take for the table, to have them eviscerated as soon as possible, and also to have them kept in the coolest place that may be available. A good plan is to have them packed, not in green grass, as is usually done, but rather in dry straw,—dryness rather than moisture being most favourable to the keeping of them fresh, and on the same principle, their inside should be wiped with a clean cloth before they are packed.—J. D.

(*Rivers suitable to the Grayling, page* 178.)

In confirmation of the greater delicacy of the grayling, as to temperature, compared to the trout, and of its intolerance of great vicissitudes of river-temperature, I may mention, that though this fish is plentiful, even more so than the trout, in the preserved parts of the Derbyshire Wye and Derwent, it is almost unknown in the Lathkil and the Bradford, tributaries of the Wye, abounding in trout, and as carefully preserved. All attempts to introduce it into these streams have failed. Their inaptitude has been attributed to a difference in the quality of their water: it has been said to be harder, more petrifying; but this I have not been able to confirm by chemical examination—

indeed, the water of the Wye proved to be equally hard, if not harder, and to contain a little sulphate of lime, which could not be detected in the water of the Lathkil. The mean difference appeared to me to be in the character of the several rivers, in relation to volume, mode of flowing, and temperature; the Wye and Derwent being fuller and more constant streams, less liable to be frozen in winter, and unduly heated in summer,—streams, in all respects, like these described by the author, as peculiarly suitable to the grayling; and further, from the nature of their bottom, insuring a larger and more constant supply of that kind of food, water-snails, larvæ, squillæ, &c., which the grayling—a fish needing good and plentiful food in winter—seems to require. That the mere chemical nature of the water is not the main cause of the unfitness of the Lathkil for grayling seems to be shown by the circumstance that it enters the lower part of that stream, and even breeds there a little above the junction with the Wye, but does not ascend beyond the first fall,—a fall that the trout readily passes, and which is not, I believe, higher than some in the Wye and Derwent, that the grayling is known to surmount.—J. D.

(*Use of the Scales of the Eel, page* 198.)

Mention is made of the scales of the eel as likely to facilitate the progressive motion of this fish when out of water. Considering the nature of these scales, doubt may be entertained on this point. From an examination I have made of them, I find they are commonly oval, about the 555th of an inch in their long diameter, symmetrically arranged in compartments, approaching in form the oval. These may be seen with a common magnifying-glass; but to distinguish the scales individually, a high magnifying power is required. Their form, I may add, is best seen after a portion of the integuments has been exposed to a charring or incinerating heat. In the latter instance, when the charcoal is consumed their skeleton remains, consisting of phosphate of lime, just perceptibly coloured by peroxide of iron. Now, as these minute scales seem to be adhering closely by their entire surface, and as the skin of the animal is lubricated with viscid mucus, it is not obvious, nor does it seem probable, that they can be of any service for locomotion in the manner supposed by the author.

The idea seemingly entertained by the author in the page next to that last referred to, that the eel, by continued residence in the sea, may acquire the size and be confounded with the conger, does not accord with the best observations of naturalists —most of them made since the publication of Salmonia. That they are distinct species can hardly now be doubted,—even generically they are now held to be distinct. The circumstance that the number of vertebræ in the two differ—in the common fresh-water eel being 116, and in the common conger 156, as stated by Mr. Yarrell,—is a strong proof of their distinctness; and not less so is the fact (first noticed, I believe, by Sir John Richardson,*) that the conger is destitute of scales. I have examined its skin, in the same manner as the skin of the eel, for scales, and neither before incineration nor after, have I detected any, using a high magnifying power.

The use of the minute scales of the eel, in all the species of the genus Anguilla, may be considered a problem, comparing them with the allied genera, as they are now constituted, which are without scales, viz., conger, muræna, and ophisurus, and these again with the electrical fishes, the torpedo, gymnotus and silurus, in the skin of which no rudiments even of scales, in the instances I have examined, can be detected. The common and natural idea, that the scales of fishes are destined for defensive armour, is not well accordant with these examples, excepting on the supposition that the want of them in the electrical fishes is compensated by the electrical organs of these fishes, and in the others by the thickness and strength of their integuments: in the cutis of the conger I have found on incineration a large proportion of phosphate of lime.—J. D.

(*On the Food of the Shelley, page* 264.)

The author states that the lavaret, or shelley, is taken only with nets; that it feeds on vegetables; and that he had never found in the stomachs of those he had opened either flies or small fishes. The first fish of this kind that I saw taken was with a small fly: this was in Hawes Water. During nearly half a century only two or three instances of its being so caught

* "The Zoology of the Voyage of H. M. S. Erebus and Terror, Part vii. —Fishes. By Sir John Richardson."

were known there. In the stomach of this fish—a fish abundant in Hawes Water—I found the remains of two or three different kinds of small flies. That it is not oftener taken with a fly is not surprising, when we consider that comparatively large artificial flies are commonly used in lake-fishing, and, moreover, keeping in mind the conformation of its mouth and tongue, without teeth, or, if any (in the one I examined there were a few towards the apex of the tongue and in the upper-lip), so small as to be microscopic. According to Dr. Knox, the vendace of Lochmabon, which seems to differ very little, if at all, from the shelley, feeds principally on minute entomostracous animals. This has been confirmed by Mr. Yarrell, who found also in the stomachs of some he examined portions of flies. Now, as the structure of its mouth and that of the shelley seem nowise adapted for feeding on vegetables, and I cannot learn that these have been detected in its stomach, it is more than probable that its food is chiefly animal.

The shelley of Hawes Water, I may add, breeds in the still water of the lake, depositing the ova on aquatic plants. It is never known to run up the tributary streams. The breeding-time of this fish is the autumn. The intelligent keeper at Hawes Water told me that once, in September, he took some of its roe from the "moss" (conferva, &c.) of the lake, which he transferred to a basin, and, by changing the water daily, succeeded in hatching the ova. The young fish, when they first appeared, he described as being hardly half an inch in length, provided with a yolk-bag and a marginal posterior fin, i. e. one connecting the dorsal, caudal, and anal; after about five weeks they acquired the size of ordinary minnows, with the colouring and decided, unmistakeable character of the shelley.—J. D.

THE END.

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ERRATA.

Page 26, line 16, *for* "that," *read* "who."
„ 79, line 25, *for* "go," *read* "got."
„ 105, line 23, *for* "becomes," *read* "become."
„ 263, line 12, *for* "wartmann," *read* "salmo Wartmanni."
„ 284, line 12, insert "a" before "female salmon."
„ 287, line 21, *for* "78," *read* "10."
„ 300, line 32, *for* "even," *read* "ever."